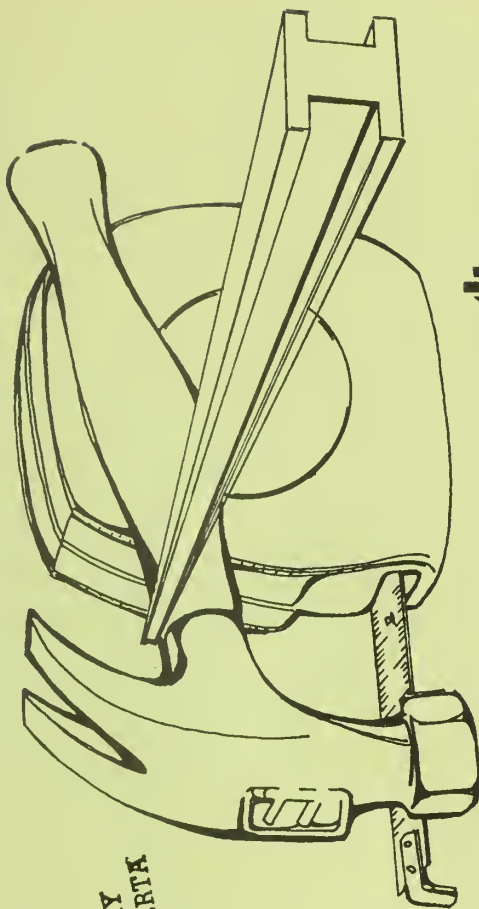


# INDUSTRIAL EDUCATION

## 10-20-30

## MATERIALS

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The Department of Education acknowledges with appreciation the contribution of the following ad hoc committee members to the preparation of this guide.

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NOTE: This Curriculum Guide is a service publication only. The Senior High School Program of Studies contains the official statement concerning Senior High School Industrial Education. The information contained in the guide is prescriptive insofar as it duplicates that contained in the Program of Studies. There are in the guide, however, as well as content, methods of developing the concepts, suggestions for the use of teaching aids and lists of additional reference books.

NOTE:

Industrial Education 10, 20 and 30 is made up in four (4) packages according to career fields.

Teachers may select modules from a number of fields and consequently will need those packages that contain the content for the modules they plan to teach.

The packages are color-coded and contain the following career fields:

- |    |  |   |        |
|----|--|---|--------|
| A. | Electricity-Electronics  | - | yellow |
| B. | Materials  | - | green  |
| C. | Power Technology   | - | blue   |
| D. | Visual Communications  | - | orange |
| E. | The general modules of Research, Development and Production Science will be found in each package. |   |        |

Study the content of the modules carefully and select those that best meet the needs of the students in the school, your own competencies and the availability of tools and equipment.

# T A B L E O F C O N T E N T S

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| III. OBJECTIVES  | 4         |
| IV. ORGANIZATION | 5         |
| V. EVALUATION    | 9         |
| VI. CONTENT      | 9         |

## VII. COURSE GUIDES:

|                            |                  |
|----------------------------|------------------|
| A. Electricity Electronics | - yellow package |
| B. Materials               | - green package  |
| C. Power Technology        | - blue package   |
| D. Visual Communications   | - orange package |
| E. General                 |                  |
| 1. Research                |                  |
| 2. Developmental           |                  |
| 3. Production Service      |                  |





## I . I N T R O D U C T I O N

The Industrial Education 10, 20, 30 series of courses is designed to provide exploration of, and orientation to, a wide variety of career options. These courses provide guidance to students to help them select more in-depth courses for occupational preparation or simply add to their technological "know-how".

Through the program, students are able to work in an environment which is conducive to challenging their intellect and developing their talents in a number of technical and craft areas. Students become aware of the interrelationship and the dependency of one technology upon the others. They have the opportunity to develop an understanding of the principles and skills required in the various occupations. Students will have many opportunities to apply academic skills learned in other subjects to their lab work.

## I I . P H I L O S O P H Y

Industrial Education adds a new dimension to the program for educating young people at the secondary school level. For many students it will open new options to help prepare them for the life ahead while enjoying their studies now. The authors of the Industrial Education curriculum recognize that the needs of society have changed, and with them the approach to knowledge acquirement. Students today must be helped to learn how to learn, to conduct inquiry, to study independently, to make choices and decisions, to use technology, and to live with change.

The Industrial Education program is concerned with career development. Because careers today do not develop along predictable lines, our education program must provide considerable flexibility so that students have an option of several career choices. This is possible for several reasons. A person who has been broadly educated is able to learn what he needs to know, within limitations, about a new job. With the general education level of society rising, the future worker needs broad as well as experience-based education. Such an education offers him subsequent chances for rapid and successful specialization. With this in mind the learning experiences should be such that they become the basis upon which specialization can be built.

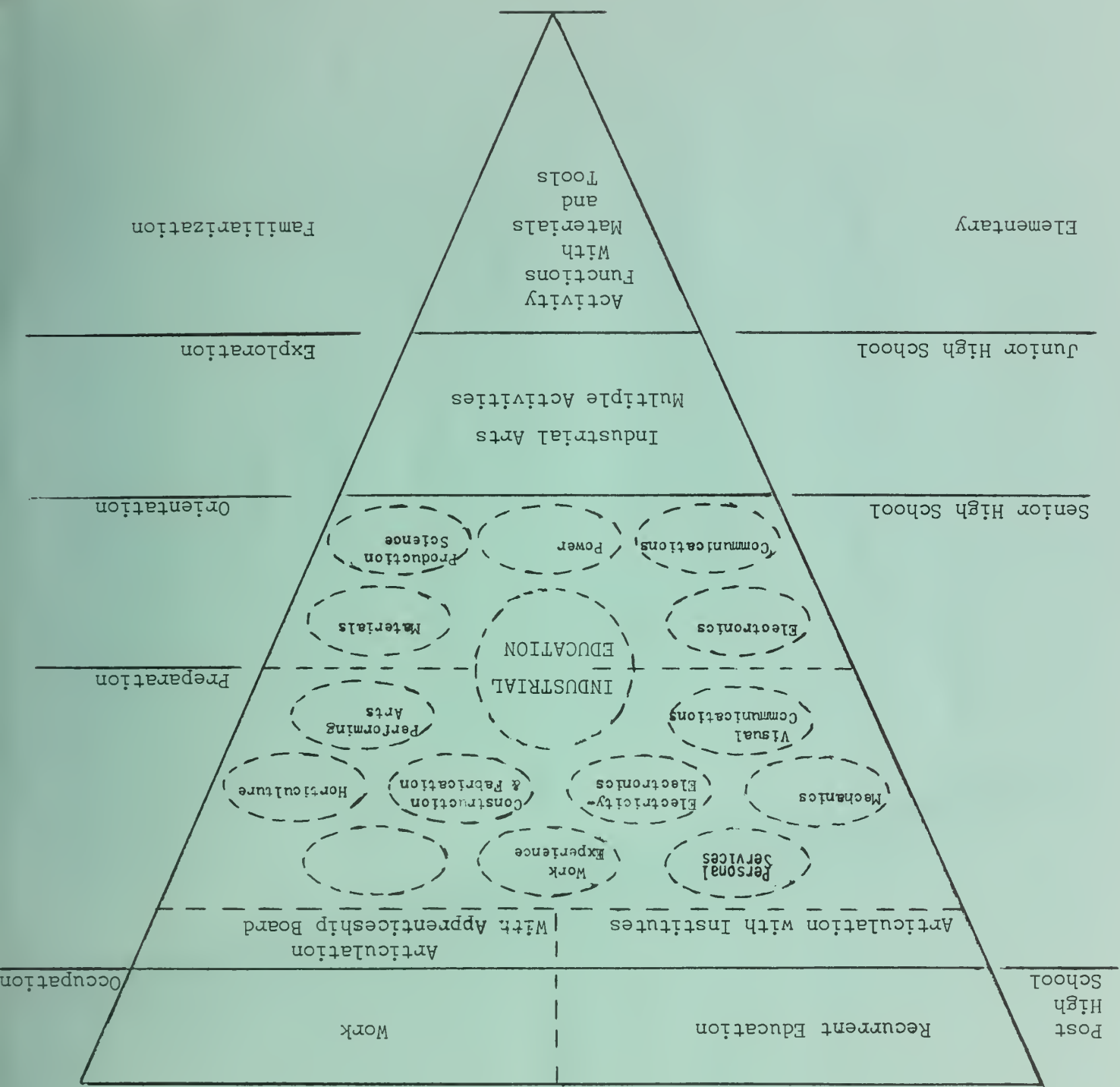
Our task in the secondary school then, is to provide students not only with entry skills for several careers but to orient the program to meet social and cultural goals. This means that the various courses or disciplines must be interrelated. Industrial Education provides a unique opportunity for the teacher to demonstrate these relationships and further, to capitalize on them by means of the motivation created through practical applications.

Thus the experiences to which students are exposed should provide them with realistic criteria for career guidance.

Industrial Education is a program consisting of courses that provide a continuum of experiences, starting with exploratory experiences and activities in the elementary and junior high school, expanding in the high school to the development of skills in career fields and culminating in on-the-job experience.

Industrial Arts, the exploratory phase of the continuum, provides the opportunity for the students to explore, reason, experiment and discover the reality of the technological society in which they live. The content of the program deals with industry, its organization, materials, processes, products, occupations, and the problems resulting from the impact of technology on society.

Following the exploratory phase, students may begin orientation studies in a career field. They may select modules of a more general nature in the Industrial Education 10, 20, 30 series or alternately take an introductory 12 course related directly to a career field. From here they advance to the more specific courses in the Industrial Education 22-32 program which prepare them for a career. The chart on page 3 illustrates the Industrial Education Program in conceptual form, showing the advancement of a student from the awareness or familiarization stage to exploration, orientation, preparation and finally, an occupation. These courses provide in-depth experiences in the development of skills in tool and machine operation, material processes, drawing and interpretation and a knowledge of the basic concepts related to the technologies. All the courses place emphasis on practical work and applied theory.



### I I I . O B J E C T I V E S

The objectives of Industrial Education 10, 20, 30 are as follows:

#### A. Personal Growth

To provide opportunities for the individual growth of the student through the development of acceptable personal and social values necessary in a productive society.

1. To provide a technical environment which motivates and stimulates individuals to discover their interests and develop personal and social responsibilities.
2. To assist in the development of positive attitudes toward safety.
3. To assist in the development of positive attitudes towards conservation and ecology.
4. To assist in the development of consumer values.

#### B. Career Exploration

To provide the student with experiences which will assist in making realistic career choices.

1. To provide students within a technical environment an opportunity to become acquainted with the skills, technical requirements, working conditions, responsibilities, opportunities and rewards in a variety of career fields.
2. To relate their own interests, abilities, likes, dislikes and values to several career fields.



### C. Occupational Skills

To develop basic competencies, integrating cognitive and psychomotor skills to enter a family of occupations or post-secondary institutions for further education.

1. To provide exploratory experiences in the use of tools, equipment and materials appropriate to various technologies prevalent in a productive society.
2. To develop an understanding of the interrelationships of various technologies.
3. To provide a technical environment for students to synthesize their accumulated knowledge in the solution of practical problems.
4. To assist the student to develop habits that will be conducive to the establishment of a safe environment.

## I V . O R G A N I Z A T I O N

### A. Program Organization

The Industrial Education 10, 20, 30 courses consist of 55 one-credit modules of content. The modules are categorized into career fields. Four career fields, i.e. Graphic Communications, Electricity-Electronics, Materials and Power Technology have the content of the modules outlined in this guide.

#### 1. Regular Program

Courses may be made up by arranging combinations of modules drawn from the fifty-five available modules. These should be selected carefully to meet the needs of the students while at the same time providing appropriate consideration to factors such as suitability of facilities, equipment availability, supply costs and teacher experience or training. Each course may be taught for 4 or 5 credits (100 - 125 hours). The content for each module may range from 25 - 33 hours. Four modules of 33 hours each would provide the necessary time for a five-credit course. Four 25-hour modules would meet the time requirements for a four-credit course. The selection and sequence of modules is left to the teacher's discretion.

Procedurally, students will register in a course made up of four modules. The first four modules taken by a student would normally be registered as Industrial Education 10A. The next four modules would become 20A and the third set of four modules would be 30A. If some students wished to enrol in further Industrial Education courses, the next course would become 10B, with 20B and 30B following. It would be possible for students to arrange different sequences of courses if it is thought advisable. For example, one sequence might be 10A, 10B, 20A, 20B, 30A, 30B; another might be 10A, 20A, 30A, 10B, etc. Sequencing of courses will be left to local authorities. Examples of courses are as follows:

|                      |                      |                    |
|----------------------|----------------------|--------------------|
| IE 10A (4-5 credits) | IE 20A (4-5 credits) | IE 30A (5 credits) |
| IE 10B (4-5 credits) | IE 30A (4-5 credits) | IE 30B (5 credits) |

## 2. Special Consideration

In schools where vocational courses are taught, teachers have the option of using content from the "12" courses to make up the 65 hours required as prerequisite to the "22" courses. That is, in a composite high school where unit shops are available, students could be scheduled into two shops for a total of 125 hours, e.g. Auto and Welding. They could then advance to a "22" course in either or both of the two.

Students in the Industrial Education 10 program would be required to take two modules for 33 hours each, directly related to the "22" course for which they are earning the prerequisite. For example, a student would have entry to a "22" program by taking two closely related units, plus two others:

|      |  |                          |
|------|--|--------------------------|
| e.g. | Basic Woods (33 hrs.)  | 66 hrs. permit entry to  |
|      | Building Construction (33 hrs.)  | Building Construction 22 |
|      | Architectural Drawing (33 hrs.)  |                          |
|      | Basic Wiring (33 hrs.)   |                          |
|      | Approximate Total 132 hrs. = 1 Industrial Education course (5 credits) |                          |

## B. Guide Organization

The course guide is organized on the following pattern:

## 1. Career Field

All the modules are classified in four career fields:

Graphic Arts  
Electricity-Electronics  
Materials  
Power.

## 2. Module Topic

Each module will be identified by a topic title.

## 3. Generalization

The first column describes the generalization or "big idea" that students should learn. A generalization expresses a relationship between two or more concepts. It is a statement of fact which is true in more than one situation.

4. Technical and common concepts divide the topic into categories of information that are reduced to single ideas. The technical concepts are specifically related to the topic. The common concepts used in the context of this guide are concepts that have relevance for all the topics.

## 5. Learning Tasks

The learning tasks column describes what activities students are expected to engage in.

## 6. Behavioural Objectives

These describe specific changes in student behaviour which result from the learning tasks performed.

An objective is a statement describing the intended outcome for the learner. Three kinds of instructional objectives are used:

- The cognitive objectives are those concerned with knowledge. They are characterized by such terms as "identify, differentiate, analyze".

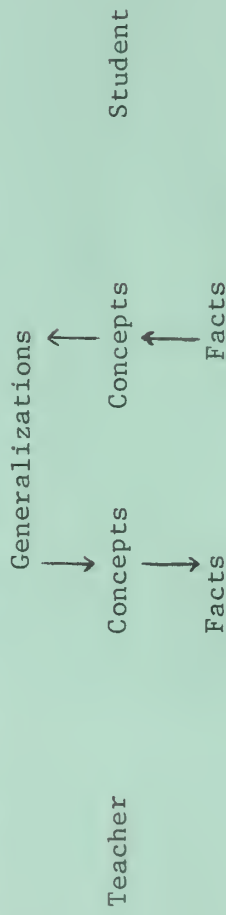
terms as "awareness" and "value" illustrate the affective objective. Such

- The psychomotor objectives are those concerned with skills and applied knowledge. They are expressed by the terms "develop skills in", and "extend skills".

The guide gives only a few sample behavioural objectives. It is the responsibility of the teacher to develop as many behavioural objectives as he/she can teach in the time available.

Facts are taken to be items of specific information, concepts are categories of information and generalizations express the relationship between concepts.

In planning a lesson, the teacher moves down this hierarchy, whereas in learning, the student begins with the facts and moves upward.



### C. Facility Organization

The organization of the physical facilities is in part determined by the original plan. There are, however, adjustments that can be made in the layout by the teacher to accommodate his/her style of teaching. The number of students in a class affects the way the lab or shop is organized. While most of the shops in Alberta are designed for 16 to 20 students, a number of factors must be considered in the final assignment of class load. These factors include:

1. physical size of the shop or laboratory
2. type of student
3. amount of equipment
4. type of programming
5. type of course
6. training and experience of the teacher.



Safety of the students and their opportunity to obtain teacher contact are important considerations when class loads are determined.

## V. EVALUATION

Evaluation of student growth should be based on stated behavioural changes and specific criteria understood by the students. Allowance should be made for both self and teacher evaluation and, in some cases, peer evaluation. Evaluation should be based on the three domains of learning as defined by an Alberta committee of Industrial Education teachers. These categories are as follows:

1. Verbal and Written Communication
2. Personal Growth
3. Manipulative Skills.

The weighting given each of the three measures will depend on the nature of the behaviour being evaluated. For a more detailed treatment of evaluation see the Industrial Education Handbook (Alberta Education, 1976).

## VI. CONTENT

The following are the titles of modules in the Industrial Education 10, 20, 30 course.

### A. Electricity-Electronics (yellow package)

1. Electricity
2. Electronics
3. Power Supplies
4. Amplifiers
5. Audio
6. Servicing
7. Radio
8. Television
9. Logic Circuits
10. Computer
11. Electric Wiring
12. Design and Construction

B. Materials (green package)

1. General Woods
2. Building Construction 1
3. Building Construction 2
4. Cabinet Construction 1
5. Cabinet Construction 2
6. General Metals
7. Sheet Metal
8. Machine Shop
9. Arc Welding
10. Oxy-Acetylene Welding
11. Foundry
12. Plastics 1
13. Plastics 2
14. Earths - Ceramics
15. Earths - Concrete
16. Textiles
17. Foods

C. Power Technology (blue package)

1. Conventional Heat Engines
2. Small Engine Tune-Up and Trouble Shooting
3. Small Engine Overhaul
4. Automobile Care
5. Automobile Tune-Up
6. Mechanical Systems
7. Electro Mechanical Controls and Circuit Trouble Shooting
8. Electrical Systems
9. Non-Conventional Power Sources
10. Appliance Repairs and Trouble Shooting
11. Hydraulics and Fluidics
12. Pneumatics and Fluidics

D. Visual Communications (orange package)

1. Principals of Offset Lithography
2. Line Photography
3. Black and White Photography
4. Color Photography
5. Screened Photography
6. Layout and Design
7. Offset and Printing Production
8. Mechanical Drafting
9. Topographical Drafting
10. Architectural Drafting
11. Relief Printing
12. Print-Making Techniques

E. General

Three modules of a general nature also are available. These are:

1. Research module
2. Developmental module
3. Production Science module.



## B. MATERIALS

### MODULES

|                         |       |
|-------------------------|-------|
| Introduction            |       |
| Objectives              |       |
| General Woods           | M. 1  |
| Building Construction 1 | M. 2  |
| Building Construction 2 | M. 3  |
| Cabinet Construction 1  | M. 4  |
| Cabinet Construction 2  | M. 5  |
| General Metals          | M. 6  |
| Sheet Metal             | M. 7  |
| Machine Shop            | M. 8  |
| Arc Welding             | M. 9  |
| Oxy-Acetylene Welding   | M. 10 |
| Foundry                 | M. 11 |
| Plastics 1              | M. 12 |
| Plastics 2              | M. 13 |
| Earths - Ceramics       | M. 14 |
| Earths - Concrete       | M. 15 |
| Textiles                | M. 16 |
| Foods                   | M. 17 |
| General                 | G. 1  |

## B. MATERIALS

### INTRODUCTION

The materials modules consist of content representing the major construction and fabrication materials and processes used in Canada. Construction and fabrication continue to be an important and necessary activity in our society.

There are seventeen one-credit modules of content which provide the students and the teacher with considerable choice in building the type of program best suited to the situation. Teachers should select modules utilizing the resources available and in harmony with the needs of their students.

The major concepts dealing with shaping, forming, fastening and finishing are outlined in the content. In addition, eight concepts common to the total program are studied where appropriate in each module.

#### 1. Consumer Awareness

- quality
- effective advertising
- specifications
- dollar value
- buying procedures
- availability
- parts
- serving

#### 2. Environmental Implications

- time element (past, present, future)
- rates of consumption
- conservation
- alternatives
- pollution (land, air, water)

### 3. Graphic Interpretation

- schematic
- symbols
- drawing interpretation
- visuals
- technical drawing and interpretation

### 4. Measurement

- British Engineering System (present English systems)
- System Internationale (S.I.)
- accuracy
- tools and instruments
- tolerances
- precision
- estimating
- approximations
- computations (including graphs, charts, interpolation)

### 5. Career Information

- benefits
- unionism
- local opportunities
- job mobility (vertical, horizontal, geographic)
- future
- retraining and upgrading
- jobs vs. careers

#### 6. Societal Implications

- time (past, present, future)
- economic
- life patterns
- status
- values and mores

#### 7. Technological Implications

- costs, benefits, consequences (C.B.C.)
- resource use and abuse
- tool development and use
- manufacturing
- servicing
- obsolescence
- design process
- planning

#### 8. Safety

- unsafe conditions
- unsafe acts

The modules as listed may be selected in the order that the teacher finds most appropriate. Two modules taught for a total of 65 hours will serve as a pre-requisite for the appropriate 22 courses in Building Construction, Machine Shop, Sheet Metal and Welding.



## 1. OBJECTIVES

The objectives of the modules in Materials are:

1. To make students aware of the variety of career areas represented by the materials area.
2. To give students an opportunity to practice processes and skills required to construct with materials.
3. To give students an opportunity to do analytical thinking in planning and constructing or fabricating a project.

## II. CONTENT SUMMARY

### Materials:

1. General Woods
2. Building Construction 1
3. Building Construction 2
4. Cabinet Construction 1
5. Cabinet Construction 2
6. General Metals
7. Sheet Metal
8. Machine Shop
9. Arc Welding
10. Oxy-Acetylene Welding
11. Foundry
12. Plastics 1
13. Plastics 2
14. Earths - Ceramics
15. Earths - Concrete
16. Textiles
17. Foods

### III. REFERENCES

The references are listed for each module.

### IV. CONTENT

Generalizations, concepts and behavioural objectives are outlined on the following pages. Teachers are expected to develop additional behavioural objectives and activities to supplement the identified content and maintain relevancy.

MATERIALS

GENERAL WOODS

MODULE ONE

## MODULE ONE

### GENERAL WOODS

Wood continues to be of major importance as a material for both furniture and building construction. This module begins the development of skills in the use of wood shaping tools and machines.

#### I. OBJECTIVES

The objectives of the module in general woods are:

1. To develop safe work habits of machine operation.
2. To provide the opportunities for students to learn and develop some facility in the use of tools and machines.
3. To develop an awareness of practical capabilities of machines and materials.
4. To have students recognize the wide range of job opportunities provided for by the materials/construction industries.

#### II. REFERENCES

1. Hackett, Donald F. & Patrick E. Spielman. MODERN WOOD TECHNOLOGY. Bruce Pub. 1968
2. Miller, Hugh G. HAND AND MACHINE WOODWORK. MacMillan, 1972
3. Rockwell DELTA BOOKS
4. Wagner, Willis H. MODERN WOODWORKING. Goodheart, 1974

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|---|--|---|--|
| 1. Productivity is dependent on safe work habits, safe operation and safe conditions.           | 1. Safety <ul style="list-style-type: none"> <li>- safe acts</li> <li>- safe conditions</li> <li>- safety controls.</li> </ul>   | The student will learn: <ul style="list-style-type: none"> <li>a. to use cutting tools in a safe way.</li> <li>b. to recognize unsafe acts and conditions.</li> </ul>                                     | The student will: <ul style="list-style-type: none"> <li>a. demonstrate safe work habits when using various tools and equipment.</li> </ul>              |
| ✓ 2. Manufacturing depends on reading and following plans and production flow charts.           | 2. Graphic Interpretation <ul style="list-style-type: none"> <li>- working drawings</li> <li>- schematics</li> <li>- pictorial drawings.</li> </ul>  | <ul style="list-style-type: none"> <li>a. to interpret various forms of graphic illustration.</li> <li>b. to draw up plans for projects.</li> </ul>   | <ul style="list-style-type: none"> <li>a. given a plan, interpret the dimensions and symbols.</li> <li>b. draw up plans for a simple project.</li> </ul> |
| 3. Accurate measurement and layout is imperative in the production of goods in our society.     | 3. Measurement <ul style="list-style-type: none"> <li>- English</li> <li>- Metric (SI)</li> <li>- accuracy</li> <li>- tolerance</li> <li>- instruments</li> <li>- units of measure.</li> </ul> | <ul style="list-style-type: none"> <li>a. how to use appropriate measuring tools, instruments and machine controls.</li> <li>b. how to calculate amount of material and extend cost estimates.</li> </ul> | <ul style="list-style-type: none"> <li>a. given a material list, calculate the cost of selected projects.</li> </ul>                                     |
| 4. The application of the wedge principle has revolutionized man's capacity to shape materials. | 4. Technological Implications <ul style="list-style-type: none"> <li>- wedge action.</li> </ul>  | <ul style="list-style-type: none"> <li>a. how the wedge principle is used in separating and removal operations.</li> </ul>  | <ul style="list-style-type: none"> <li>a. demonstrate the wedge principle by splitting a piece of wood.</li> </ul>                                       |

\* Common concepts in *script*. These are concepts common to most units.

TOPIC GENERAL WOOD

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|---|--|--|
| 5. Materials are produced or manufactured into useable forms by various machine tool operations.  | 5. Material Removal <ul style="list-style-type: none"> <li>- sawing</li> <li>- planing</li> <li>- routing</li> <li>- drilling</li> <li>- chiseling</li> <li>- filing</li> <li>- sandpaper.</li> </ul> | The student will learn: <ul style="list-style-type: none"> <li>a. how to use shaping tools.</li> </ul>   | The student will: <ul style="list-style-type: none"> <li>a. given assignment sheets and project plans, use shaping machines or tools to produce selected projects or assignments.</li> </ul> |
| 6. An industrial society must make its students aware of the many occupational choices available. | 6. Occupations <ul style="list-style-type: none"> <li>- job opportunities</li> </ul>  | <ul style="list-style-type: none"> <li>a. about various jobs in the industry or closely allied industries.</li> <li>b. about apprenticeship programs.</li> </ul>                             | <ul style="list-style-type: none"> <li>a. list training requirements for a carpenter.</li> <li>b. identify job opportunities.</li> </ul>   |
| 7. Many machines and tools are marketed for professional and vocational use.                      | 7. Consumer Awareness <ul style="list-style-type: none"> <li>- quality</li> <li>- reliability</li> <li>- replacement repair.</li> </ul>   | <ul style="list-style-type: none"> <li>a. what to look for in a good tool.</li> </ul>  | <ul style="list-style-type: none"> <li>a. list characteristics of a good quality machine or tool.</li> </ul>   |
| 8. Jobs in the materials trades take workers to all parts of the world.                           | 8. Sociological Implications <ul style="list-style-type: none"> <li>- job mobility</li> <li>- importance of machines.</li> </ul>  | <ul style="list-style-type: none"> <li>a. the importance of tools and machines to a productive society.</li> <li>b. how job mobility affects the lives of the people in a family.</li> </ul> | <ul style="list-style-type: none"> <li>a. write an essay on or discuss the topic, "The influence of machines in everyday life".</li> </ul>   |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES |
|-----------------|---|--|------------------------|
|                 | 9. Environmental Implications<br>- consumption<br>- pollution<br>i. noise<br>ii. dust<br>iii. chemical. | The student will learn:<br>a. about the effects of consumption on resources and pollution. |                        |

\* Common concepts in *script*. These are concepts common to most units.





MATERIALS

BUILDING CONSTRUCTION I

MODULE TWO

## MODULE TWO

### BUILDING CONSTRUCTION I ,

All people live in some kind of a shelter. In Canada where the climate is quite severe much of a family's income is used to provide housing.

This module, the first of two in Building Construction, introduces students to the concepts of planning homes and the skills required in the construction industry.

#### I. OBJECTIVES

The objectives of Module 2 in Building Construction are to:

1. Introduce students to planning concepts and the people who do it.
2. Provide students with the opportunity to practice reading plans and do some basic framing tasks.

#### II. REFERENCES

- Earl. EXPERIMENTS WITH MATERIALS & PRODUCTS OF INDUSTRY. McKnight.  
INTERIOR & EXTERIOR TRIM. Delmar Publishers.
- Industrial Arts Curriculum Project Staff. WORLD OF CONSTRUCTION. McKnight.  
Jones. FRAMING, SHEATHING & INSULATION. Delmar Publishers.
- Miller, H.G. HAND AND MACHINE WOODWORK. MacMillan
- Mix and Ciroir. PRACTICAL CARPENTRY Goodheart-Willcox
- Townsend, Gilbert. STEEL SQUARE. American Technical Society, 1947. 2nd ed.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS                                 | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|--|--|---|
| 1. Plans are a means of communication between the builder and the architect. | 1. Man must plan for building of a particular type of shelter. | The student will know:<br>a. how to read blueprint of a house plan.<br>b. the various building terms.<br>c. the responsibilities of the<br>-architect<br>-draftsman<br>-contractor<br>-owner.<br>d. about financing a house.<br>e. about the codes, regulations and zoning bylaws. | The student will:<br>a. Given a house plan, read the lines, measurements and symbols.<br>b. Use a code book to find minimum building standards in respect to<br>-framing openings for doors and windows<br>-joist sizes and spans<br>-window area<br>-insulation<br>-roofing materials<br>-firewalls. |
| 2. Materials and design vary in strength, purpose and aesthetic appeal       | 2. Types of Construction.                                      | a. how to frame<br>-difference between platform and balloon framing.<br>b. how to prepare the mix for concrete.  | a. List advantages and disadvantages of platform and balloon methods of construction.<br>b. Mix and test a sample of concrete.  |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS                                 | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|--|--|--|--|
| 3. Mass production has provided man with a technique to place standardized products within the purchasing power of the majority. | * <i>Technological Implications of prefabricated building.</i> | The student will learn about:<br>a. the advantages of mass production as it affects<br>-labor costs<br>-centralization of labor<br>-value of industry to a community<br>-environmental problems created. | The student will:  |
| 4. Many man-hours of labor are lost annually in industry because of accidents.   | * <i>Safety</i>  | a. safe working habits as well as safe operational techniques in the use of power tools and equipment.   | a. List general safety rules.<br>b. Safely operate the power tools.<br>c. Safely use ladders and scaffolding.<br>d. Lift heavy loads properly. |
| 5. Man's environment and his sociological position determine the values placed on shelter/housing.                               | 5. Man is influenced by his environment and society.           | a. the different types, styles and sizes of houses that people of various socio-economic groups choose to build<br>-urban/rural<br>-suburban.  |  |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|--|--|---|
| 6. Nature and scientific research have made a variety of materials available to the consumer. | 6. Building Materials.   | <p>The student will learn:</p> <p>a. about the most common materials used in a house</p> <ul style="list-style-type: none"> <li>-lumber</li> <li>-plywood</li> <li>-concrete</li> <li>-insulation</li> <li>-roofing</li> <li>-vapor barrier</li> <li>-building paper.</li> </ul> | <p>The student will:</p> <p>a. Make a collection of the materials commonly found at the building site. The construction activities can be done by students through the construction of a small building project either as individuals or as a group. The projects will vary depending on class interests and type of community.</p> |
| 7. Materials can be readily shaped and formed.  | 7. Materials are shaped by removal.  | <p>a. how to</p> <ul style="list-style-type: none"> <li>-saw</li> <li>-drill</li> <li>-plane</li> <li>-chisel.</li> </ul>  | <p>a. Given building materials, fit pieces together by shaping them with the appropriate tools.</p>   |
| 8. Materials can be combined mechanically.  | <p>8. Fastening</p> <ul style="list-style-type: none"> <li>a. mechanical fasteners</li> <li>b. joining.</li> </ul> | <p>a. about fastening with</p> <ul style="list-style-type: none"> <li>-nails</li> <li>-screws</li> <li>-dowels.</li> </ul> <p>b. about different wood joints and their advantages.</p>   | <p>a. Correctly drive nails, fasten two pieces with screws or dowels.</p> <p>b. Make the following joints</p> <ul style="list-style-type: none"> <li>-dado</li> <li>-rabbet</li> <li>-half lap.</li> </ul>  |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|--------------------------------|--|---|
|   | c. bonding                     | <p>The student will learn:</p> <ul style="list-style-type: none"> <li>c. about bonding materials using                             <ul style="list-style-type: none"> <li>-adhesion-glue</li> <li>-contact</li> <li>-cement</li> </ul> </li> <li>-chemical bonding-cement and sand</li> <li>-that the holding power and strength varies with the type of joint.</li> </ul>   | <p>The student will:</p> <ul style="list-style-type: none"> <li>c. Use glue to bond two pieces of wood together.</li> </ul>   |
| 9. Layout and measurement tools provide a means of accurate measurement necessary to the fabrication of products. | 9. Measurement and Layout      | <ul style="list-style-type: none"> <li>a. how to use measuring tools                             <ul style="list-style-type: none"> <li>-tapes</li> <li>-rules</li> <li>-T-level</li> <li>-framing square</li> <li>-spirit level</li> <li>-transit level</li> <li>-line level</li> <li>-plumb bob</li> <li>-chalk line.</li> </ul> </li> <li>b. the reason for accuracy of measurement in the construction trade.</li> </ul> | <ul style="list-style-type: none"> <li>a. Given the tools, stake out a basement using                             <ul style="list-style-type: none"> <li>-measuring tape</li> <li>-spirit level</li> <li>-transit level</li> <li>-plumb bob</li> <li>-batter boards.</li> </ul> </li> <li>b. Given the tools and information, lay out a common rafter using the "step-off" method.</li> </ul> |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|--------------------------------|--|---|
| 10. The construction industry creates many jobs in our society. | 10. Construction as a career.  | <p>The student will learn:</p> <ul style="list-style-type: none"> <li>c. how to lay out a wall.</li> <li>d. the reason for 16" centers for studs and joists.</li> <li>a. about the many professional and tradesmen's positions that are utilized in building construction.</li> <li>b. to interview construction personnel to get their views on careers and opportunities.</li> <li>c. about working conditions.</li> <li>-various</li> <li>-apprenticeship.</li> </ul> | <p>The student will:</p> <ul style="list-style-type: none"> <li>c. Given directions for openings (window, door), lay out a wall.</li> <li>d. Construct an outside corner providing inside corner support.</li> <li>a. Research the Canadian Classification and Dictionary of Occupations and list the qualifications necessary for the fields he is interested in.</li> </ul> |

\* Common concepts in *script*. These are concepts common to most units.







MATERIALS

BUILDING CONSTRUCTION 2

MODULE THREE

## MODULE THREE

### BUILDING CONSTRUCTION 2

This module expands on the topics studied in Module Two.

#### I. OBJECTIVES

The objectives of Module 3 Building Construction are to:

1. Give students the opportunity to have hands-on experiences with tools and equipment to practice skills needed in the construction trade.
2. Give the students experience in researching a career field.

#### II. REFERENCES

References are the same as listed for Module 2, plus the following:

|                   |                           |                          |
|-------------------|---------------------------|--------------------------|
| Feirer, John L.   | WOODWORKING FOR INDUSTRY. | Bennet Co., 1971         |
| Wagner, Willis H. | MODERN CARPENTRY.         | General Publishing, 1969 |

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|--|--|---|
| 1. Plans are a means of communication between the builder and the architect. | 1. Plan reading<br>-construction must adhere to rules and regulations. | The student will learn:<br>a. to read scale drawings<br>b. to reverse plans<br>c. how to interpret specifications.   | The student will:<br>a. Given plans and a code book, read several house plans to determine whether they meet minimum standards according to the National Housing Code. The standards to be checked are to be identified by the teacher. |
| 2. Materials and design vary in strength, purpose and aesthetic appeal.      | 2. Types of Construction   | a. applications of various types of construction<br>i. Frame<br>-platform<br>-balloon<br>-T-sill<br>-post and beam<br>ii. Masonry<br>-concrete<br>-block<br>-brick<br>-pre-cast<br>-stucco<br>-rock. | a. Sketch a wall section showing each type of frame construction.<br>b. Discuss masonry construction application.   |
| 3. Accidents are costly in time loss, mental anguish and material wastage.   | * <i>Safety</i>  | a. the safety rules as they apply to the operation of tools, equipment, scaffolds, ladders and site house-keeping.   | a. Identify and list unsafe conditions and practices observed on a building site.   |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|---|--|---|
| 4. Nature and scientific research have made many materials available to the consumer.          | 4. Materials for building.  | <p>The student should</p> <p>a. learn about</p> <ul style="list-style-type: none"> <li>-arborite</li> <li>-gypsum board</li> <li>-bricks</li> <li>-stucco</li> <li>-foamed plastic</li> <li>-hardboard</li> <li>-pre-cast concrete</li> <li>-siding</li> <li>-construction steel.</li> </ul>   | <p>The student will:</p> <p>a. Make a collection of various building materials and list their special properties and uses.</p>  |
| 5. Through shaping and combining materials, many different types of structures can be created. | <p>5. Shaping materials</p> <p>a. Removal</p> <p>b. Combining</p> <p>-mechanical.</p> | <p>a. observe the principles involved in the various removal processes</p> <ul style="list-style-type: none"> <li>-sawing</li> <li>-routing</li> <li>-shaping</li> <li>-shearing</li> <li>-abrading</li> <li>-turning.</li> </ul> <p>b. learn about</p> <ul style="list-style-type: none"> <li>-screws</li> <li>-bolts</li> <li>-corrugated fasteners</li> <li>-dowels.</li> </ul> | <p>a. Demonstrate an ability to identify and use tools in appropriate removal procedures.</p> <p>b. Given a fastening task, identify the appropriate fastener and apply it.</p> |

| GENERALIZATIONS         | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|-------------------------|--------------------------------|--|--|
|                         | -joining.                      | The student should learn:<br>c. the use of various joints<br>-dado<br>-mitre<br>-half-lap.                         | The student will:<br>c. Make a joint in accordance with the instructions of the teacher.               |
|                         | -bonding.                      | d. to use the right glue.  | d. Experiment with two types of glue and test them for strength and water resistance.                  |
|                         | -coating.                      | e. to combine various materials by these coating processes<br>-staining<br>-fillers<br>-oil<br>-paint<br>-varnish. | e. During the period of this course, enhance a wood material by using one of the finishing procedures. |
| c. Forming<br>-casting. |                                | f. about how concrete is made and how forms to hold it during the curing period are made.                          | f. Make a form and cast one article with concrete.   |

\* Common concepts in *script*. These are concepts common to most units.

TOPIC FRAME CONSTRUCTION

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|---------------------------------|--|--|
| <p>6. Materials are combined by various methods to become integral units of the finished structure.</p> | <p>6. Construction Methods.</p> | <p>The student should study:</p> <p>a. drawings of</p> <ul style="list-style-type: none"> <li>-foundation footings</li> <li>-foundation walls</li> <li>-joist layout</li> <li>-spacing double joists headers</li> <li>-stair and fireplace openings, bridging</li> <li>-beam construction</li> <li>-bearing wall construction</li> <li>-sub-flooring</li> <li>-shiplap/boards</li> <li>-plywood</li> <li>-stud walls</li> <li>-partition walls</li> <li>-ceiling joists</li> <li>-truss rafter.</li> </ul> | <p>The student will:</p> <p>a. Lay out a plan and build a small building or build a model utilizing all the techniques listed under tasks.</p> |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|--|--------------------------------|---|--|
| 7. Many trades are involved in the construction of a building. | 7. The Sub Trades.             | <p>The student should:</p> <p>a. study and observe the installation of electric wiring</p> <p>-plumbing</p> <p>-drywall taping and filling.</p> <p>b. become aware of the dependence of the construction industry on many trades and that each must be completed at a certain stage before the next step in construction can proceed.</p> | <p>The student will:</p> <p>a. Use code books to become acquainted with the regulations that tradesmen must conform to,</p> <p>Ex. National Building Code.</p>   |
| 8. Materials used in construction must meet standards.         | 8. Materials Testing.          |   | <p>a. Follow a logical procedure in setting up at least one of the following tests (students could be assigned different tests so that, as a class, a variety could be provided):</p> <ul style="list-style-type: none"> <li>-load tests on different wood species</li> <li>-load tests on different joist spanning</li> <li>-tests of beam strength</li> <li>-tests on truss rafters</li> <li>-adhesive bonding tests</li> <li>-strength of and holding power of gang fasteners used in truss construction</li> <li>-holding power of screws vs. nails</li> </ul> |

\* Common concepts in script. These are concepts common to most units.



| GENERALIZATIONS | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS | BEHAVIOURAL OBJECTIVES   |
|-----------------|--------------------------------|----------------|--|
|                 |                                |                | <ul style="list-style-type: none"> <li>-strength tests on concrete vs. steel reinforced concrete</li> <li>-tests on concretes varying in cement-sand ratio</li> <li>-tensile strength of laminated woods</li> <li>-effect of heat and weather on pre-finished siding</li> <li>-soil tests -compaction</li> <li>-stability</li> <li>-density</li> <li>-water limit</li> <li>-insulation tests</li> <li>-heat transfer</li> <li>-heat absorption</li> <li>-sound proofing</li> <li>-fire proofing</li> <li>-cold penetration.</li> </ul> |

\* Common concepts in *script*. These are concepts common to most units.

## TOPIC FRAME CONSTRUCTION

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|--------------------------------|--|---|
| 9. The construction industry creates many jobs in our society. | 9. Construction as a career.   | <p>The student should learn about</p> <ul style="list-style-type: none"> <li>-working conditions</li> <li>-unions and benefits</li> <li>-apprenticeship</li> <li>-job security</li> <li>-skill required</li> <li>-wages/salary.</li> </ul> | <p>The student will:</p> <p>a. Investigate at least two occupational opportunities in the construction field</p> <ul style="list-style-type: none"> <li>-surveyor</li> <li>-architect</li> <li>-heavy equipment operator</li> <li>-framing carpenter</li> <li>-finishing carpenter</li> <li>-laborer</li> <li>-mason</li> <li>-plumber</li> <li>-electrician</li> <li>-plasterer</li> <li>-roofer</li> <li>-heating contractor</li> <li>-drywall taper</li> <li>-rug layer</li> <li>-utility personnel</li> <li>-telephone</li> <li>-water/sewer</li> <li>-cable T.V.</li> <li>-sound systems.</li> </ul> |

\* Common concepts in *script*. These are concepts common to most units.



MATERIALS

CABINET CONSTRUCTION 1

MODULE FOUR

## MODULE FOUR

### CABINET CONSTRUCTION 1

#### INTRODUCTION

In this module students become acquainted with the forest industry, wood materials and their production and have the opportunity of making several projects.

#### I. OBJECTIVES

The objectives of this module in woods is:

1. To develop an awareness of materials production from available natural resources.
2. To develop an awareness of research and forest management.
3. To develop a consumer knowledge of available materials in this industry.
4. To develop some skills in tool use.

#### II. REFERENCES

- |                  |                            |                           |
|------------------|----------------------------|---------------------------|
| 1. Miller, H. G. | HAND AND MACHINE WOODWORK. | Macmillan, 1972.          |
| 2. Feirer, J.    | WOODWORKING FOR INDUSTRY.  | 1971.                     |
| 3. Wagner, W. H. | MODERN WOODWORKING.        | General Publishers, 1974. |

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|---|--|--|
| 1. Production of materials for present and future use depends on intelligent use of present reserves and planning for future needs. | 1. Environmental Implications <ul style="list-style-type: none"> <li>- utilization</li> <li>- conservation</li> <li>- reforestation</li> <li>- tree farming</li> <li>- research</li> <li>- disease prevention</li> <li>- pollution control</li> </ul> | The student will learn: <ul style="list-style-type: none"> <li>a. about forest management in relation to conservation and utilization.</li> </ul>  | The student will: <ul style="list-style-type: none"> <li>a. discuss the need for conservation management to provide materials for future generations.</li> <li>b. write an essay on how forestation and related industries affect his/her life.</li> </ul> |
| 2. Forestry provides employment for many people both in remote and urban centers.   | 2. Sociological Implications <ul style="list-style-type: none"> <li>- societal</li> <li>- kinds of jobs</li> <li>- job mobility</li> <li>- economic</li> <li>- occupational</li> </ul>  | <ul style="list-style-type: none"> <li>a. about the variety of jobs offered by forestry and related industries.</li> <li>b. about job training requirements and opportunities for employment.</li> </ul> | <ul style="list-style-type: none"> <li>a. list jobs available in the forestry industry.</li> <li>b. prepare a file on one career area of interest listing education requirements, where obtained and job opportunities. Use the CCOD.</li> </ul>           |
| 3. Many products are manufactured from by-products of the lumber industry.  | 3. Material Forming <ul style="list-style-type: none"> <li>- restructuring</li> <li>- conditioning</li> <li>- molding</li> </ul>  | <ul style="list-style-type: none"> <li>a. how to make plywood, particle board and chipboard.</li> <li>b. about seasoning methods.</li> <li>c. about molding applications.</li> </ul>                     | <ul style="list-style-type: none"> <li>a. discuss methods of making plywood.</li> <li>b. explain the reason for seasoning lumber.</li> <li>c. make one project requiring the lamination of materials in a mold.</li> </ul>                                 |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|--|---|---|---|
| 4. Testing of materials is important in the selection of the most appropriate and economical material to be used for a specific purpose. | 4. Materials Testing <ul style="list-style-type: none"> <li>- structure</li> <li>- properties</li> <li>- behavior</li> </ul>                      | The student will learn: <ul style="list-style-type: none"> <li>a. about the structure of wood</li> <li>b. identification</li> <li>c. classification</li> <li>d. uses</li> <li>e. physical properties <ul style="list-style-type: none"> <li>- strength</li> <li>- resilience</li> </ul> </li> </ul> | The student will: <ul style="list-style-type: none"> <li>a. compare three kinds of wood on the basis of strength <ul style="list-style-type: none"> <li>- hardness</li> <li>- bending capacity</li> <li>- wearing properties</li> <li>- kindling point</li> </ul> </li> </ul> |
| 5. Nearly all accidents occur as a result of unsafe acts and/or unsafe conditions.   | 5. Safety <ul style="list-style-type: none"> <li>- safe acts</li> <li>- safe conditions</li> </ul>  | <ul style="list-style-type: none"> <li>a. safe procedures for using machines and materials.</li> <li>b. to recognize unsafe conditions or acts.</li> </ul>  | <ul style="list-style-type: none"> <li>a. demonstrate safe procedures when using tools and materials.</li> <li>b. observe a work situation and compile a report listing unsafe conditions and acts.</li> </ul>  |
| 6. Accurate measurement is imperative in the production of goods and services in our society.  | 6. Measurement <ul style="list-style-type: none"> <li>- production control</li> <li>- scaling</li> <li>- tolerances</li> <li>- grading</li> </ul> | <ul style="list-style-type: none"> <li>a. about estimating, scaling logs, stand-ard sizes tolerances in production and grading procedures.</li> </ul>   | <ul style="list-style-type: none"> <li>a. given several boards, identify blemishes that affect grade.</li> <li>b. describe in an essay the importance of production control with regard to allowable size tolerances.</li> </ul>  |



TOPIC CABINET CONSTRUCTION 1

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|--|---|---|---|
| 7. Wood and other materials are combined to form products to provide a finish.                             | 7. Material Combination <ul style="list-style-type: none"> <li>- bonding</li> <li>- coating</li> <li>- fasteners</li> </ul> | The student will learn: <ul style="list-style-type: none"> <li>a. about <ul style="list-style-type: none"> <li>- adhesives</li> <li>- resins</li> <li>- prefinished materials</li> <li>- finishes <ul style="list-style-type: none"> <li>- oil</li> <li>- varnish</li> <li>- shellac</li> </ul> </li> <li>- fasteners such as <ul style="list-style-type: none"> <li>- joints</li> <li>- nails</li> <li>- screws</li> <li>- dowels</li> </ul> </li> </ul> </li> </ul> | The student will: <ul style="list-style-type: none"> <li>a. given materials and instructions for a project, determine how to shape the materials and then combine them to achieve the plan.</li> <li>b. finish the project by coating it with an appropriate material.</li> </ul> |
| 8. It is important to read working drawings accurately.  | 8. Graphic Interpretation   | a. how to read a plan.  | a. finish the project by fine sanding, coating and then polishing if varnish is used.   |
| 9. Through the use of machines applying the wedge principle materials can be shaped by mechanical removal. | 9. Material Removal <ul style="list-style-type: none"> <li>- abrading</li> </ul>  | a. how abrasives are used in shaping wood products and in finishing procedures such as pumice rotten stone.   |   |

\* Common concepts in *script*. These are concepts common to most units.



MATERIALS

CABINET CONSTRUCTION 2

MODULE FIVE

## MODULE FIVE

### CABINET CONSTRUCTION 2

#### INTRODUCTION

In this module students further their knowledge of wood as a material as they construct a piece of furniture.

#### I. OBJECTIVES

The objectives of this module in cabinet construction are to:

1. Give students the opportunity to develop an appreciation for furniture design and the materials of construction.
2. Give students the opportunity to apply and practice quality construction procedures.
3. Give students the opportunity to select and use finishing materials.

#### II. REFERENCES

1. Fierer, J. and Hutchings                      ADVANCED WOODWORK AND FURNITURE MAKING. 4th Ed.
2. Groveman, Chris H. and Glazener, E. R.      TECHNICAL WOODWORKING. McGraw Hill, 1966.
3. Soderberg, George A.                          FINISHING TECHNOLOGY. McKnight and McKnight, 1969.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|---|---|---|--|
| 1. Furniture must be well designed to have strength and aesthetic appeal.               | 1. Graphic Interpretation <ul style="list-style-type: none"> <li>- pictorial</li> <li>- schematics</li> <li>- scale drawings</li> <li>- working drawings</li> <li>- pattern making</li> </ul> | The student will learn: <ul style="list-style-type: none"> <li>a. the terminology of design: <ul style="list-style-type: none"> <li>- balance</li> <li>- form</li> <li>- line</li> <li>- proportion</li> </ul> </li> <li>b. how to interpret drawings.</li> </ul>   | The student will: <ul style="list-style-type: none"> <li>a. design a small piece of furniture and make patterns as required for its construction.</li> </ul>                         |
| 2. Most accidents occur as a result of unsafe acts and/or unsafe conditions.            | 2. Safety <ul style="list-style-type: none"> <li>- unsafe acts</li> <li>- unsafe conditions</li> </ul>  | a. to identify unsafe acts and conditions.  | a. demonstrate safe procedures when using tools and materials.   |
| 3. Function and design depend on accuracy of layout during construction or manufacture. | 3. Measurement <ul style="list-style-type: none"> <li>- metric (SI)</li> <li>- English</li> </ul>   | <ul style="list-style-type: none"> <li>a. to use the metric system of measurement.</li> <li>b. how to measure parts accurately and within tolerances.</li> <li>c. the units of measurement related to quantity <ul style="list-style-type: none"> <li>- area and volume</li> <li>- linear</li> <li>- area only</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>a. build a piece of furniture using metric measure.</li> <li>b. plan the project and make out a materials list complete with cost.</li> </ul> |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|---|--|---|
| 4. Through the use of tools and machines the cutting action of which is based on the wedge, principle materials are shaped by removal by mechanical means. | 4. Material Removal <ul style="list-style-type: none"> <li>- sawing - mortising</li> <li>- planning - boring</li> <li>- jointing - turning</li> <li>- shaping - routing</li> <li>- drilling - abrading</li> </ul> | The student will learn: <ul style="list-style-type: none"> <li>a. to use the appropriate tool for the function.</li> </ul>   | The student will: <ul style="list-style-type: none"> <li>a. utilize the tools and equipment in a safe manner.</li> </ul>  |
| 5. Materials can be combined permanently by cohesion and adhesion and semi-permanently by mechanical means   | 5. Material Combination <ul style="list-style-type: none"> <li>- fabrication by joinery</li> <li>- mechanical fasteners</li> <li>- bonding</li> <li>- coating</li> </ul>  | <ul style="list-style-type: none"> <li>a. to use appropriate joints, fasteners or bonding materials suited to the function.</li> <li>b. how to select appropriate furniture finishes.</li> </ul> | <ul style="list-style-type: none"> <li>a. make joints appropriate to his/her project accurately and within tolerances as determined by the teacher.</li> <li>b. select an appropriate finish for the project and apply it in accordance with instructions.</li> </ul> |
| 6. Materials can be shaped by compressing or stretching them into shape.   | 6. Material Forming <ul style="list-style-type: none"> <li>- laminating</li> <li>- steam bending</li> <li>- inlaying</li> </ul>   | <ul style="list-style-type: none"> <li>a. how to laminate materials.</li> </ul>  | <ul style="list-style-type: none"> <li>a. if time permits, laminate or steam bend material to make a small product.</li> </ul>  |

TOPIC CABINET CONSTRUCTION 2

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|---|--------------------------------|---|---|
| 7. Manufacturing provides many job opportunities in cabinet and furniture industries. | 7. Occupational                | The student will learn:<br>a. how to use the Canadian Classification and Dictionary of Occupation.        | The student will:<br>a. prepare a file on occupations of personal interest in the cabinet trade complete with educational requirements, apprenticeship and job opportunities. |
| 8. Mass production makes many products readily available on the consumer market.      | 8. Consumer Awareness          | a. how to select good furniture by checking<br>- quality<br>- guarantees<br>- servicing<br>- dollar value | a. do a comparative shopping exercise on one type of product of his own selection.<br>At least three bids should be reviewed.   |

\* Common concepts in script. These are concepts common to most units.





MATERIALS

GENERAL METALS

MODULE SIX

## MODULE SIX

### GENERAL METALS

Metals play a major role in our lives. Products produced from metal are manufactured by many processes.

This module in metals is designed to give the student exploratory experiences in a number of metal forming, machinery and fabricating processes. The time required for this module is between 25 and 33 hours.

#### I. OBJECTIVES

The objectives of General Metals are to:

1. Introduce the student to a wide variety of processes related to material removal, combustion and forming.
2. Provide the student with the opportunity to practice a number of processes in removing, combining and forming metals.

#### II. REFERENCES

- |   |  |                      |
|---|--|----------------------|
| 1. Boyd, T. Gardner.                      | METAL WORKING.                                     | Goodheart, 1975      |
| 2. Feirer, John L.                        | GENERAL METALS.                                    | McGraw, 1967 3rd ed. |
| 3. Feirer, John L.                        | MACHINE TOOL METALWORKING: PRINCIPLES & PRACTICES. | McGraw, 1973         |
| 4. Lindbeck, John R. & Irving T. Lathrop. | GENERAL INDUSTRY.                                  | Bennett Co, 1969     |
| 5. Delmar.                                | HARD PROCESSES.                                    |                      |
| 6. Delmar.                                | MACHINE PROCESSES.                                 |                      |
| 7. Ludwig.                                | METAL WORK.  |                      |

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|--------------------------------|--|---|
| 1. A productive society must prepare its population to make realistic vocational choices. | 1. Occupational Information    | The student should learn:<br>a. how to get information on careers.<br><br>b. how to utilize the Canadian Classification and Dictionary of Occupations. | The student will:<br>given suitable resources<br>a. identify the major areas of work in the metals industry.<br>b. describe three jobs or occupations in the metals industry.<br>c. find information about courses, apprenticeship or training in metals industry in Alberta.   |
| 2. Nearly all accidents occur as a result of unsafe acts or unsafe conditions.            | * <i>Safety</i>                | a. about visual inspection for safety.   | a. given approved equipment, tools and safety apparel, the student will visually inspect his work area to ensure all are in safe condition.<br><br>b. given approved equipment, tools and safety apparel, the student will use these to perform the required operations and activities of the course using safe procedures as demonstrated and described by reference materials and by the teacher. |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|--|--|---|
| 3. Metals must be separated from their ore body and refined to make them a useful fabricating material.                            | 3. Metal Extraction<br>a. smelting ferrous metals.<br><br>b. non-ferrous metals. | The student will learn:<br>a. retrieval of iron and steel. | The student will:<br>a. given suitable reference materials, describe Canada's steel industry as to location of raw materials, their transportation, location of processing areas.<br><br>b. describe the four steel making processes<br>-open hearth<br>-electric furnace<br>-basic oxygen<br>-Bessemer converter.<br><br>c. describe the mining and refining of bauxite.<br><br>d. describe the difference between ferrous and non-ferrous metals. |
| 4. Tools and machines through the application of the wedge principle are used to shape materials by removal with mechanical means. | 4. Material Removal<br>a. mechanical removal<br>-shearing                        | a. the principle of the wedge as used to remove material.  | a. given a safe area, equipment and safety apparel, identify the following shearing tools:<br>-snips<br>-squaring shears<br>-notcher<br>-chisels<br>-tapes and dies<br>-punches.  |

| GENERALIZATIONS | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|-----------------|--------------------------------|--|---|
|                 | -turning                       | <p>The student will:</p> <p>b. know the main parts of an engine lathe.</p>                                     | <p>The student will:</p> <p>b. demonstrate the safe and proper use of the above mentioned tools to remove metal.</p> <p>c. safely use the lathe to perform the following operations (use aluminum)</p> <ul style="list-style-type: none"> <li>i turning</li> <li>ii facing</li> <li>iii drilling</li> <li>iv knurling.</li> </ul> |
|                 | -shaping                       | <p>a. learn how to remove material by shaping.</p> <p>b. learn how to identify the main parts of a shaper.</p> | <p>a. given a safe area, equipment and safety apparel, correctly adjust and safely use the shaper to square stock.</p>  |
|                 | -milling                       | <p>c. learn to identify the main parts of a horizontal milling machine.</p>                                    | <p>c. correctly adjust and safely use the milling machine to do</p> <ul style="list-style-type: none"> <li>-plain milling</li> <li>-angular milling.</li> </ul>   |
|                 | -drilling                      |  | <p>d. use files to smooth stock.</p> <p>e. perform drilling operations using</p> <ul style="list-style-type: none"> <li>-hand drills</li> <li>-electric drills</li> <li>-drill press.</li> </ul>  |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS                                  | BEHAVIOURAL OBJECTIVES                                  |
|---|--------------------------------|---|---|
|   | -sawing                        | The student will learn:                         | The student will:                                       |
|   | -abrading                      | d. to identify abrasive papers and cloths.      | f. separate materials using a hacksaw and power saw.    |
|   |                                |   | g. use the grinder to sharpen a chisel and shape stock. |
|   |                                |   | h. use abrasive papers and cloths                       |
|   |                                |   | -emery cloth  |
|   |                                |   | -wet or dry sand paper.                                 |
| 5. Materials can be shaped by compressing or stretching them into shape.  | 5. Material Forming            | a. how metals can be formed.                    | a. use the following forming tools                      |
|   | a. compression/ stretching.    |   | -hammers and mallets                                    |
|   |                                |   | -bar folder   |
|   |                                |   | -pen brake  |
|   |                                |   | -slip rolls   |
|   |                                |   | -anvils   |
|   |                                |   | -slakes.  |
| 6. Materials may have their physical properties changed by thermal means. | 6. Material Restructuring.     | a. how metal can be restructured by using heat. | a. harden and temper steel.                             |

\* Common concepts in script. These are concepts common to most units.



| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS                    | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|--|---|--|--|
| 7. Materials are combined and assembled permanently by cohesion and adhesion and semi-permanently by mechanical means. | 7. Fastening<br>a. mechanical                     | The student will learn:<br>a. how to use mechanical fasteners. | The student will:<br>a. use the following mechanical fasteners to join metal<br>-bolts<br>-screws<br>-rivets<br>-threaded assembly.  |
|  | b. adhesion                                       | b. how to solder.  | b. given a safe area, equipment and safety apparel, join metal by soldering.   |
|  | c. cohesion                                       | c. how to spot weld.   | c. joint metal by spot welding.  |
| 8. Accurate measurement and layout is imperative in the production of most products in our society.                    | 8. Measurement.<br>a. British Engineering System. | a. how to use the English units.                               | a. given a safe area, equipment and safety apparel, use the following measuring and layout tools<br>-rules and tapes<br>-squares<br>-compasses and dividers<br>-calipers<br>-awls and scribes<br>-center punch<br>-verniers and micrometers. |
|  |   | b. Metric units.   | b. make a product where layout and measurement involves metric (S.I.) units.   |
|  |   |  | c. list the structural shapes into which steel is formed.  |

\* Common concepts in *script*. These are concepts common to most units.



MATERIALS

SHEET METAL

MODULE SEVEN

## MODULE SEVEN

### SHEET METAL

#### INTRODUCTION

Metals play a major role in our lives. Products made from metal are manufactured by varied processes.

This module will give students some experience and skill in working with sheet metal.

#### I. OBJECTIVES

The objectives of this module in sheet metal are to:

1. Introduce the student to a variety of material removal, combination and forming processes.
2. Provide the student with the opportunity to practice a number of the procedures.

#### II. REFERENCES

- |                     |                              |                       |
|---------------------|------------------------------|-----------------------|
| 1. Feirer, John L.  | GENERAL METALS.              | McGraw, 1967. 3rd ed. |
| 2.                  | SHEET METAL MACHINE PROCESS. | Delmar.               |
| 3. Zinngrabe, C. J. | SHEET METAL HAND PROCESS.    | Delmar, 1974.         |

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|---|---|---|--|
| 1. A productive society must prepare its population to make realistic vocational choices. | 1. Occupational Information.  | The student will learn:<br>a. how to use the Canadian Classification and Dictionary of Occupations.<br>b. how to find information on courses available and apprenticeship requirements.<br>c. to identify sound types of hems, seams and joints used in quality sheet metal work. | The student will:<br>a. prepare a file on occupational information related to the sheet metal trade.   |
| 2. Nearly all accidents occur as a result of unsafe acts and/or unsafe conditions.        | * <i>Consumer Awareness</i><br><br>2. Safety<br>a. unsafe conditions<br>b. unsafe acts. | a. procedure for evaluating unsafe conditions.<br>b. to analyze activities for unsafe acts.   | a. visually inspect his working area for unsafe conditions.<br>b. use tools and equipment required to do the activities of the course in a safe manner as demonstrated and described by reference materials teacher. |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS                              | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|---|---|---|---|
| 3. Accurate measurement and layout is imperative in the production of most products which are mass produced.                            | 3. Measurement and Layout<br>a. British System<br>b. Metric | The student will learn:<br>a. the procedures used to layout on metal.<br>b. how to make stretch-out patterns.<br>c. how to use metal templates.<br>d. how to use metric measure (S.I.). | The student will:<br>a. given instruction and equipment, use the following layout tools<br>-rules and tapes<br>-squares<br>-compasses and dividers<br>-awls and scribes<br>-gauges<br>-layout fluids<br>to prepare a pattern for a project.   |
| 4. Materials are changed in size and shape by the removal of material by tools and machines whose cutting action is based on the wedge. | 4. Material Removal<br>a. shearing<br>b. drilling           | a. to identify shearing tools<br>-snips<br>-squaring shears<br>-notcher<br>-chisel<br>-punch.<br>b. to use tools safely.  | a. given instructions and materials, make straight, irregular and notch cuts in sheet metal.<br>b. cut duplicate pieces of sheet metal.<br>c. make internal holes for rivets or sheet metal screws.<br>d. use a hand drill, electric drill and drill press to drill holes in sheet metal. |

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|---|--|--|
|   | <p>c. sawing</p> <p>d. abrading</p> <p>e. other</p>   | <p>The student will learn:</p> <p>c. how to cut thin metals with a saw.</p> <p>d. how to use abrasive papers.</p> <p>e. how to safely use the bench grinder.</p> <p>f. about other methods used in industry such as</p> <ul style="list-style-type: none"> <li>-slitting</li> <li>-blanking</li> <li>-piercing</li> <li>-chemical cutters.</li> </ul> <p>a. how to use hammers and mallets to shape metal</p> <ul style="list-style-type: none"> <li>-setting hammers</li> <li>-rivetting hammers</li> <li>-ball peen hammer</li> <li>-seamers.</li> </ul> | <p>The student will:</p> <p>c. use a hacksaw to separate material.</p> <p>d. use emery cloth, wet or dry sandpaper to polish metal eg. his project.</p> <p>e. use a bench grinder to sharpen a chisel or knife.</p> <p>a. given the instructions and equipment use the vise, anvil, stokes to shape metal.</p> |
| <p>5. Materials can be shaped by compressing or stretching them into shape.</p> | <p>5. Material Forming.</p> <ul style="list-style-type: none"> <li>- compressing</li> <li>- stretching</li> </ul> |  |  |

\* Common concepts in script. These are concepts common to most units.



| GENERALIZATIONS | TECHNICAL AND *COMMON CONCEPTS      | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|-----------------|-------------------------------------|---|---|
|                 |                                     | <p>The student will learn:</p> <p>b. how to form metal using the various machines</p> <ul style="list-style-type: none"> <li>-slip roll</li> <li>-combination rotary machine</li> <li>-crimping and beading machine.</li> </ul> | <p>The student will:</p> <p>b. use the bar folder.</p>  |
|                 | <p>Industry coldworking methods</p> | <p>c. how industry uses the following methods</p> <ul style="list-style-type: none"> <li>-press forming</li> <li>-stamping</li> <li>-drawing</li> <li>-spinning</li> <li>-hydroforming</li> <li>-rubber forming.</li> </ul>     | <p>c. use the pan break.</p> <p>d. make a variety of seams</p> <ul style="list-style-type: none"> <li>-grooved and double</li> <li>-single and double hems</li> <li>-wired edge.</li> </ul> <p>e. use the slip roll.</p> <p>f. use the combination rotary machine.</p> <p>g. use the crimping and beading machine.</p> <p>h. write a report on one of the forming methods used in industry.</p> |

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|--|--|--|--|
| 6. Materials are combined and assembled permanently by cohesion and adhesion and semi-permanently by mechanical means. | 6. Material Combination<br>a. mechanical fastening<br><br>b. adhesion<br><br>c. cohesion | The student will learn:<br>a. how to determine the type of fastener to use.<br><br>b. how to use the appropriate tools and machines.<br><br>c. how to identify different forms of solder and fluxer<br>-wire, bar.<br><br>d. how to use soldering irons to join metal<br>-conditioning copper.<br><br>e. how to use epoxy glues to join metal. | The student will:<br>a. given the tools and materials join metal using<br>-tinner's rivets<br>-pop rivets<br>-screws<br>-bolts.<br><br>b. join metals by forming:<br>-grooved and double seam.<br><br>c. given the materials and instructions, use both a gas heated copper and an electric soldering copper to solder metal.<br><br>d. join metal by gluing or cementing.<br><br>e. join metal using a spot welder. |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES                          |
|--|---|---|---|
| 7. The development and effective use of a nation's natural and synthetic resources is necessary to a productive society. | 7. Materials<br>a. Metals<br>-ferrous<br>-non-ferrous.<br>b. Sheet metal. | The student will learn:<br>a. to describe and give examples of ferrous metals.<br>b. to identify non-ferrous metals.<br>c. about the basic metals used in sheet metal construction. | The student will:                               |
| 8. Cold rolled sheet steel requires some type of protective coating to guard against rusting.                            | 8. Protective Coating<br>-paint<br>-galvanizing<br>-porcelain enamel.     | a. how the various processes for coating metal are performed and know the advantages of each.   | a. coat a project using an appropriate coating. |

MATERIALS

MACHINE SHOP

MODULE EIGHT

## MODULE EIGHT

### MACHINE SHOP

#### INTRODUCTION

Machine tools are basic to an industrial society. Their use in shaping materials has wide application.

This module will give students some experiences in the use of the basic machine shop equipment.

#### I. OBJECTIVES

The objectives of this module in machine shop are to:

1. Introduce the students to a wide variety of material removal, combination and forming processes.
2. Provide the students with the opportunity to use the equipment to perform a number of the processes.

#### II. REFERENCES

1. Feirer, John L. MACHINE TOOL METALWORKING: PRINCIPALS AND PRACTICE.  
McGraw, 1973. 2nd ed.
2. Walker. MACHINING FUNDAMENTALS.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS                             | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|--|--|---|
| 1. A productive society must prepare its members to make realistic vocational choices.                       | 1. Occupational Information                                | The student will learn:<br>a. how to use the Canadian Classification and Dictionary of Occupations.<br>b. how to find information on courses available in post-secondary instruction and apprenticeship. | The student will:<br>a. prepare a file on occupational information related to the machine shop trade.<br>b. list educational requirements for a machinist or millwright.<br>c. list job opportunities in the area.  |
| 2. Nearly all accidents occur as a result of unsafe acts and/or unsafe conditions.                           | 2. Safety<br>a. Unsafe conditions.<br>b. Unsafe acts.      | a. the procedure for evaluating unsafe conditions.<br>b. to analyze activities for unsafe acts.  | a. visually inspect his working area for unsafe conditions.<br>b. use tools and equipment required to do the activities of the course in a safe manner as demonstrated and described by reference materials and the teacher.  |
| 3. Accurate measurement and layout is imperative in the production of most products in a productive society. | 3. Measurement<br>a. British System.<br>b. Metric Measure. | a. how to use measuring and layout tools.<br>b. to use metric measure on a project.  | a. given equipment and instructions use the following measuring and layout tools<br>-rules<br>-squares<br>-compasses and dividers<br>-calipers<br>-awls and scribes<br>-verniers<br>-micrometers<br>-layout fluids.<br>b. make a project where measurement involves metric units (S.I.) |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS      | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|-------------------------------------|--|--|
| 4. Through the use of tools and machines whose cutting action is based on the wedge principle, materials are shaped by removal. | 4. Material Removal<br>a. shearing. | The student will learn:<br>a. to identify tools<br>-chisels<br>-taps and dies.<br>b. types of threads<br>N.C.N.F., Metric.<br>c. how to use handfiles.<br>a. the main parts of the engine lathe. | The student will:<br>a. given tools and instructions remove material by chipping with a chisel.<br><br>b. use a file to shape metal.<br><br>a. given instructions and the equipment, perform the following operation on the lathe<br>-turning to size<br>-facing<br>-dulling<br>-knurling<br>-cut off stock. |
|   | b. turning.                         | b. how to set lathe up for turning.<br>c. to make some single projects eg. handle for screwdriver.   |  |
|   | c. shaping.                         | d. the parts of a shaper.<br>e. how to correctly adjust the shaper.<br>f. the safety procedures.   | b. square stock on the shaper.   |



| GENERALIZATIONS | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|-----------------|--------------------------------|--|---|
|                 | d. milling.                    | The student will learn:<br>g. the parts of the mill.<br>h. methods of holding stock.<br>i. operations done on a milling machine. | The student will:<br>c. correctly adjust and use the milling-machine to do<br>-plain milling<br>-angular milling.           |
|                 | e. drilling.                   | j. the parts of the drillpress.<br>k. methods of holding work.<br>l. how drills are sized.                                       | d. safely set up and use the following equipment to drill holes in metal<br>-hand drill<br>-drill press<br>-electric drill. |
|                 | f. sawing.                     | m. how to sharpen drills<br>n. how to use a hacksaw.<br>o. about different kinds of hacksaw blades.                              | e. sharpen a drill bit.<br>f. separate material using<br>-a hacksaw<br>-a power hacksaw<br>-a metal cutting bandsaw.        |
|                 | g. abrading.                   | p. how to safely use a grinder.<br>q. about the use of various abrasive papers.  | g. use a grinder to shape metal and to sharpen tools.<br>h. use abrasive papers to polish metal.                            |
|                 | h. forming.                    |  | i. given tools and materials, forge a screwdriver blade.  |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|--|--|--|
| <p>5. Metals may have their physical properties changed by thermal means.</p> <p>6. Materials are combined permanently by cohesion and adhesion and semi-permanently by mechanical means.</p> | <p>5. Restructuring metals.</p> <ul style="list-style-type: none"> <li>- Thermal restructuring.</li> </ul> <p>6. Material combination.</p> <ul style="list-style-type: none"> <li>- Mechanical.</li> </ul> | <p>The student will learn:</p> <ul style="list-style-type: none"> <li>a. how to heat-treat a hammer head.</li> <li>a. how to thread a bolt using a die.</li> </ul> | <p>The student will:</p> <ul style="list-style-type: none"> <li>a. given the materials and instructions harden and temper steel.</li> <li>a. join metal using a threaded assembly, eg. assemble the head and handle of a tack hammer using a threaded assembly.</li> </ul> |

MATERIALS

ARC WELDING

MODULE NINE

## MODULE NINE

### ARC WELDING

#### INTRODUCTION

Welding is a very important metal joining process in the manufacturing, construction and service industries. The two types of welding, arc and oxy-acetylene, are treated separately. This allows for greater flexibility in shop usage and in meeting the specific interests of the students.

#### I. OBJECTIVES

The objectives of this module in arc welding are to:

1. Introduce the student to the basic arc welding processes and techniques.
2. Provide the student with the opportunity to practice the basic skills in electric arc welding.

#### II. REFERENCES

- |                              |  |                        |
|------------------------------|--|------------------------|
| Kennedy, Gower A.            | WELDING TECHNOLOGY.                            | Sams, 1974.            |
| Pender, James A.             | WELDING.                                       | McGraw, 1968.          |
| Tuttle, C.A. and G. F. Sear. | FUNDAMENTALS OF OXY-ACETYLENE AND ARC WELDING. | Pitman, 1968. Rev. ed. |

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS                        | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|---|--|--|
| 1. Career selection is an important function of secondary education.            | 1. Occupational information                           | The student will:<br>a. learn how to use the Canadian Classification and Dictionary of Occupations.<br>b. study the calendar of courses for NAIT/SAIT or a Community College.                        | The student will:<br>a. given suitable resources, identify several major areas of work within the welding trade.<br>b. prepare a file on welding courses available and the requirements of apprenticeship.<br>c. identify occupations related to welding.                                |
| 2. Nearly all accidents occur as a result of unsafe acts and unsafe conditions. | 2. Safety<br>a. unsafe conditions.<br>b. Unsafe acts. | a. learn procedure for checking unsafe conditions and analyzing unsafe acts.<br>b. the reasons for using protective clothing when welding.<br>c. describe hazards in arc welding<br>-burns<br>-eyes. | a. given approved equipment, tools and safety apparel, visually inspect the work area to ensure that all are safe.<br>b. use tools to perform required operations and activities of the course in a safe manner as demonstrated and described by reference materials and by the teacher. |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|--|--------------------------------|---|--|
| 3. Materials are combined and assembled permanently by cohesion and adhesion and semi-permanently by mechanical means. | 3. Cohesion                    | <p>The student will learn:</p> <ul style="list-style-type: none"> <li>a. how to set up an arc welder for various rod sizes.</li> <li>b. the names of the various parts of the welder and the equipment that goes with it.</li> <li>c. how to hold the rod to make smooth strong welds.</li> <li>d. why rods of different sizes are used.</li> <li>e. effect of heat on penetration.</li> <li>f. causes of weak weld.</li> <li>g. the effects of expansion and contraction.</li> </ul> | <p>The student will:</p> <ul style="list-style-type: none"> <li>a. given suitable reference materials, set the arc welder to the appropriate range for welding.</li> <li>b. list and describe the purpose of each piece of equipment used in arc welding.</li> <li>c. practice striking an arc and running a short flat bead.</li> <li>d. given mild steel coupons of 16 ga and 1/8" thickness and rods of 1/16", 1/8" and 3/32" diameter, run uniform horizontal beads as demonstrated by the teacher.</li> <li>e. fusion weld in the flat position the following joints               <ul style="list-style-type: none"> <li>-butt</li> <li>-lap</li> <li>-outside corner</li> <li>-fillet.</li> </ul> </li> </ul> |

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|--|--|--|
| 4. Engineering materials have a great number of properties which must be identified in order to use them effectively. | <p>4. Testing welds</p> <p>a. non-destructive.</p><br><br><br><p>b. destructive.</p> | <p>The student will learn:</p> <p>a. to inspect welds for penetration and strength.</p> <p>b. how inspection is done with x-ray, ultrasonic penetrant and magnetic particles.</p> <p>c. the meaning of hardness, ductility and tensile strength as applied to metals.</p> <p>d. about destructive tests</p> <p>-corner joint,<br/>hammer flat<br/>-tee; hammer flat<br/>-lap; hammer to tee<br/>-edge; form a "Y".</p> | <p>The student will:</p> <p>a. given various sized coupons, practice making welds as prescribed by the teacher.</p> <p>b. apply at least one test to a student made weld.</p><br><br><br><p>c. given a safe area, use the appropriate destructive test to evaluate his own weld.</p> |

\* Common concepts in *script*. These are concepts common to most units.





MATERIALS

OXY-ACETYLENE WELDING

MODULE TEN

## MODULE TEN

### OXY-ACETYLENE WELDING

#### INTRODUCTION

Oxy-Acetylene Welding has many applications that are unique to this process. It is a versatile and practical skill to develop for both occupational or personal use.

#### I. OBJECTIVES

The objectives of this module in Oxy-Acetylene Welding are to:

1. Introduce the students to the basic skills and processes of the welding trade.
2. Provide the students with the opportunity to practice the basic techniques in Oxy-Acetylene Welding.

#### II. REFERENCES

Same as for Module Nine.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS                        | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|---|--|---|
| 1. A productive society must prepare its population to make realistic vocational choices. | 1. Occupational Information.                          | The student will:<br>a. learn how to use the Canadian Classification and Dictionary of Occupations.<br>b. study the calendar of courses available in NAIT, SAIT, Community Colleges.     | The student will:<br>a. given resource materials, identify several major areas of work within the welding trade.<br>b. prepare a file on welding courses available and the requirements of apprenticeship.  |
| 2. Nearly all accidents occur as a result of unsafe acts and/or unsafe conditions.        | 2. Safety<br>a. unsafe conditions.<br>b. unsafe acts. | a. learn how to check the work area for unsafe conditions.<br>b. learn the proper safe procedures for handling welding equipment.<br>c. learn what to do in case of fires or explosions. | a. given appropriate welding equipment, test it for hazards such as leaks, obstructions, etc.<br>b. given approved equipment and safety apparel, use these to perform the required operations and activities of the course using safe procedures as demonstrated and described by reference materials and by the teacher. |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|--------------------------------|--|---|
| 3. Materials are combined and assembled permanently by cohesion. | 3. Cohesion                    | <p>The student will learn:</p> <ul style="list-style-type: none"> <li>a. how acetylene and oxygen are produced.</li> <li>b. how to store and handle the tanks and regulators.</li> <li>c. how to start up and shut down the equipment.</li> <li>d. how to balance to a neutral flame.</li> <li>e. how different tip-sizes affect heat.</li> <li>f. the angle torch should be held for penetration.</li> <li>g. about the effect of neutral, carburizing and oxidizing flames on the puddle.</li> <li>h. about the effects of expansion and contraction and how to use and control it.</li> </ul> | <p>The student will:</p> <ul style="list-style-type: none"> <li>a. list and describe the purpose of each piece of oxy-acetylene equipment.</li> <li>b. check out equipment and prepare it for start-up, then light the torch and adjust the flame following the procedure demonstrated by the teacher.</li> <li>c. given appropriate materials, run uniform beads without rod as demonstrated by the teacher.</li> <li>d. run horizontal beads with rod.</li> <li>e. fusion weld in the flat position the following joints                             <ul style="list-style-type: none"> <li>- butt</li> <li>- lap</li> <li>- outside corner</li> <li>- fillet.</li> </ul> </li> </ul> |

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS                | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|---|--|---|
| 4. Materials are combined and assembled permanently by adhesion.  | 4. Adhesion.<br>- braze weld.                 | The student will learn:<br>a. to write a report on the non-fusion process.<br>b. to describe the braze welding process, its terminology and application.   | The student will:<br>a. given a safe area, equipment and safety apparel, 16 gauge and 1/8" mild steel coupons, 1/8" braze rod (s/w flux coating)<br>- run a braze weld bead<br>- braze weld a lap and fillet joint. |
| 5. It is important to test the quality of welds to ensure safety. | 5. Testing Weld<br>- non-destructive testing. | a. to differentiate between destructive testing and inspection of materials.<br>b. to define the following methods of inspection<br>-x-ray<br>-ultrasonic<br>-penetrant<br>-magnetic particle<br>-visual<br>c. about the properties of metals: hardness, ductility and tensile strength. | a. apply at least one of the tests to a student-made weld.  |

\* Common concepts in script. These are concepts common to most units.

TOPIC OXY-ACETYLENE WELDING

M. 10 - 6  
O.W.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|---|--------------------------------|---|---|
| 6. Metals may be removed or separated by thermal means. | 6. Flame Separation.           | <p>The student will learn:</p> <p>a. how to use the torch for cutting</p> <ul style="list-style-type: none"> <li>- a straight line</li> <li>- a curve or make</li> <li>- a hole.</li> </ul> <p>b. about the hazards involved.</p> <p>c. about the principle of oxy-acetylene cutting.</p> | <p>The student will:</p> <p>a. given a safe area, equipment and safety apparel, 1/8" and 1/4" mild steel make straight and curved cuts as demonstrated by the teacher.</p> <p>b. pierce a hole.</p> |

\* Common concepts in *script*. These are concepts common to most units.



MATERIALS

FOUNDRY

MODULE ELEVEN

## MODULE ELEVEN

### FOUNDRY

#### INTRODUCTION

Foundry is a very important metal process used to produce thousands of different articles ranging from small jewelry to large industrial presses. The casting processes of foundry are the only economical methods of producing many of the irregularly shaped articles used in our modern society.

Foundry is set up as a 25 - 30 hour module. The main emphasis will be on the sand casting process which is the oldest and most widely used in industry. The course is designed to give the student an opportunity to try the different processes involved in foundry from patternmaking to finishing a casting.

#### I. OBJECTIVES

The objectives of the module in Foundry are to:

1. Introduce the student to some of the skills and operations found in foundry.
2. Provide the student with the opportunity to try his hand at performing some foundry skills and operations.

#### II. REFERENCES

1. Feirer, John L.      GENERAL METALS.      4th edition.
2. Smith.      PATTERNMAKING AND FOUNDING.

#### III. SAFETY

Great care must be exercised when handling hot and molten metal. Students must wear safety apparel when working with these. The teacher must be present to supervise the removal from the furnace and the pouring of the metal.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS                      | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|---|--|---|
| 1. A productive society must prepare its population to make realistic vocational choices. | 1. Occupational Information.                        | The student will learn:<br>a. how to use the Canadian Classification and Dictionary of Occupations to find career information. | The student will:<br>a. given suitable resources, find the information relevant to the foundry trades.<br>b. find information about courses, apprenticeship, or training in foundry trades and jobs.  |
| 2. Nearly all accidents occur as a result of unsafe acts and unsafe conditions.           | 2. Safety<br>a. unsafe acts<br>b. unsafe conditions | a. how to identify unsafe conditions and acts.   | a. given approved equipment, tools and safety apparel, visually inspect his work area to ensure all are in safe condition.<br>b. use these to perform the required operations and activities of the course using safe procedures as demonstrated and described by reference materials and by the teacher. |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|---|--|--|
| 3. Metals must be separated from their ore body and refined to make them a useful fabricating material. | 3. Metals Extraction<br>a. smelting ferrous metals<br>b. non-ferrous metals | The student will learn:<br>a. how iron is retrieved from ore.<br>b. how aluminum is obtained.<br>c. to know the difference between ferrous and non-ferrous metals. | The student will:<br>a. given suitable reference materials, describe the smelting of iron in a blast furnace.<br>b. describe the mining and refining of bauxite. |
| 4. Man must come to terms with the cost of retrieving natural resources.                                | 4. Environmental Implications of Mining.                                    | a. about conservation<br>-pollution<br>-ways of reducing environmental disruption and destruction.   |  |
| 5. Metals when heated to a liquid state can be shaped by the casting process.                           | 5. Material Forming<br>a. Sandblasting<br>-patterns.                        | a. about patterns<br>- how made and used.  | a. given suitable reference materials, describe different types of patterns commonly used in foundry.  |

| GENERALIZATIONS | TECHNICAL AND *COMMON CONCEPTS               | LEARNING TASKS | BEHAVIOURAL OBJECTIVES   |
|-----------------|--|----------------|--|
|                 | -sand  |                | <p>The student will:</p> <p>b. describe the constituents and qualities of foundry sand.</p> <p>c. identify and describe use of the following foundry tools</p> <p>(1) cape and drag</p> <p>(2) rammer</p> <p>(3) trowels and slicks</p> <p>(4) sprue cutters</p> <p>(5) lifter</p> <p>(6) brushes and bellows.</p> <p>d. describe the following furnaces for preparing metal for casting</p> <p>.</p> <p>(1) cupola</p> <p>(2) rotary furnace</p> <p>(3) tilting furnace</p> <p>(4) crucible furnace.</p> <p>e. Given approved equipment and a safe working area,construct a simple pattern and a split pattern.</p> |
|                 | -tools                                       |                |  |
|                 | -furnaces                                    |                |  |
|                 | b. Foundry Practice<br>-pattern construction |                |  |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|-----------------|--|--|--|
|                 | -conditioning sand<br>-preparing a mold<br>-casting aluminium<br>-finishing<br>c. Other Casting Processes. | The student will learn:<br>b. about other casting processes such as <ul style="list-style-type: none"> <li>- die casting</li> <li>- investment casting</li> <li>- permanent mold casting</li> <li>- shell mold casting.</li> </ul> | The student will:<br>f. prepare sand for making a sand mold. Use muller.<br>g. make a sand mold using: <ul style="list-style-type: none"> <li>- simple pattern.</li> <li>- split pattern.</li> </ul> h. melt and pour aluminium using sand molds.<br>i. finish casting by using approved metal removal methods.<br>j. given suitable reference materials, describe the following casting processes <ul style="list-style-type: none"> <li>- die casting</li> <li>- investment casting</li> <li>- permanent mold casting</li> </ul> k. compare the five casting processes <ul style="list-style-type: none"> <li>-advantages and disadvantages</li> <li>-metals cast</li> <li>-economics</li> <li>-technical implications.</li> </ul> |

MATERIALS

PLASTICS I

MODULE TWELVE

## MODULE TWELVE

### PLASTICS I

#### INTRODUCTION

The role of plastics in our lives has increased tremendously since the first commercial plastics were exhibited in the early 1860's. It is predicted that by 1980 more products by volume will be manufactured from plastics than from any other single material.

There are two modules of plastics. The first module deals with cutting, finishing and assembling plastic products as well as the construction of molds for forming plastic. The second module deals with plastics forming and fabricating techniques designed specifically for the plastics industry.

#### 1. OBJECTIVES

The objectives of this module in plastics are to:

1. Introduce the students to some of the common methods used to form and shape plastic products.
2. Provide an opportunity for students to experience a variety of processes in fabricating and shaping products made of plastics.

#### II. REFERENCES

- |                       |                             |            |               |
|-----------------------|-----------------------------|------------|---------------|
| 1. Baird, Ronald J.   | INDUSTRIAL PLASTICS.        | Goodheart, | 1971.         |
| 2. Cherry, Raymond.   | GENERAL PLASTICS.           | McKnight,  | 1967. Rev.ed. |
| 3. Cope, Dwight W.    | COPE'S PLASTICS BOOK.       | Goodheart, | 1973.         |
| 4. Richardson, Terry. | MODERN INDUSTRIAL PLASTICS. | Sams,      | 1974.         |
| 5. Swanson, Robert S. | PLASTIC TECHNOLOGY.         | McKnight,  | 1965.         |



| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS                         | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|--|--|--|--|
| 1. A productive society must prepare its members to make realistic vocational choices. | 1. Occupational Information.                           | The student will learn:<br>a. how to use the Canadian Classification and Dictionary of Occupations.<br>b. how to find information on the plastics industry and the availability of jobs. | The student will:<br>a. prepare a file on occupational information related to the plastics industry.                         |
| 2. Nearly all accidents occur as a result of unsafe acts and/or unsafe conditions.     | 2. Safety.<br>a. unsafe conditions.<br>b. unsafe acts. | a. procedure for evaluating unsafe conditions.<br>b. to analyze activities for unsafe acts.  | a. visually inspect the working area for unsafe conditions.<br>b. practice precautions when handling catalysts, resins, etc. |
| 3. Plastics are man-made materials possessing varied qualities and characteristics.    | 3. Classification.                                     | a. to define types of plastics<br>-thermoplastic<br>-thermosetting.<br>b. how plastics are made<br>-raw materials<br>-processes<br>-forms, manufacturing rods, sheets, etc.              | a. map location of world plastic industries.   |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|---|--|---|
| 4. Through the use of tools and machines whose cutting action is based on the wedge principle, materials are shaped by removal with mechanical means. | 4. Material Removal.<br>a. shearing.<br><br>b. turning.<br><br>c. drilling<br><br>d. sawing | The student will learn:<br>a. how regular wood-working tools can be used to shape plastics.<br><br><br>b. how to select the appropriate saw for the specific job<br><br>-hacksaw<br>-circular saw<br>-band saw<br>-jig saw<br>-hand saw. | The student will:<br>a. use wedge cutting tools to shape plastics<br>-shears<br>-snips<br>-chisel<br>-plane.<br>b. use the lathe to shape plastics by turning<br>-turn<br>-face<br>-drill<br>-knurl.<br>c. use the wood lathe to produce a wooden mold for the vacuum/blow former.<br>d. use the file to smooth plastics.<br>e. drill holes in plastic.<br>f. use saws to fabricate molds and to cut sheet acrylic. |

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|---|--|---|---|
|   | e. abrading  | The student will learn:<br>c. how to sand and buff to polish acrylic plastic.<br>a. to measure and layout accurately.   | The student will:<br>g. polish a plastic project (acrylic).<br>a. use the metric units of measure to lay out products.<br>a. use working drawings in the construction of a product.   |
| 5. Measurement is basic to manufacture.   | 5. Measurement.  | a. to read working drawings.  |   |
| 6. It is important to read working drawings accurately.                                 | 6. Graphic Interpretation.   | a. how research attempts to curb pollution.   |   |
| 7. Man must come to terms with the cost of retrieving and conserving natural resources. | 7. Environmental Implications<br>-conservation<br>-research<br>-pollution.                   | b. how government and private agencies attempt to conserve raw materials.   |   |
| 8. Materials can be shaped by compressing or stretching them into shape.                | 8. Material Forming<br>a. Thermoforming:<br>-mechanical<br>-vacuum forming<br>-blow forming. | a. about the chemical changes that take place in the plastic when heated.<br>b. how the vacuum process works.<br>c. about the thermoforming processes of<br>-drape vacuum forming<br>-blow forming. | a. make a product, using a mold and finishing it properly<br>-use polystyrene plastic<br>-make own mold; basic plug and ring type.<br>b. make a wooden mold, funnel or bowl, for vacuum forming.<br>c. vacuum form the product, using styrene plastic.<br>d. make a mold for blow forming.<br>e. make a plastic product using the mold. |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---|---|--|--|
| 9. Materials are combined and assembled permanently by cohesion and adhesion and semipermanently by mechanical means. | 9. Material Combination Cohesion.   | The student will learn:<br>a. how to join plastics using solvents or cement.   | The student will:<br>a. fabricate a product using acrylic plastic and join the parts by using a solvent for cementing or by thermal means (screw-driver handle and blade). |
| 10. How we use our natural resources will in large measure determine our standard of living.                          | 10. Societal Implications<br>-job mobility<br>-maintenance<br>-economics. | a. how and where people must live and work if involved in the production of raw materials and the manufacture of plastic goods.<br><br>b. how plastics have affected our life style.<br><br>c. how the economy is affected by the demand for plastics. |  |

MATERIALS

PLASTICS 2

MODULE THIRTEEN

## MODULE THIRTEEN

### PLASTICS 2

#### INTRODUCTION

The ease of shaping and forming plastics and their strength have made them a desirable material for mass production. This module will deal with some of the industrial processes that can be simulated in the school laboratory.

#### I. OBJECTIVES

The objectives of this module in plastics are to:

1. Introduce students to some of the basic industrial processes used to shape and form plastics.
2. Provide an opportunity for students to practice performing the processes used in shaping plastics.

#### II. REFERENCES

Same as for Module Twelve.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS                               | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|---|--|---|--|
| 1. A productive society must prepare its members to make realistic vocational choices.              | 1. Occupational Information.                                 | The student will learn:<br>a. how to use the Canadian Classification and Dictionary of Occupations.<br>b. how to find information on the plastic industry and courses available in post-secondary institutions. | The student will:<br>a. research the qualifications a person needs for specific jobs in the plastic industry.  |
| 2. Man must recognize the cost of industrialization in terms of the destruction of the environment. | 2. Environmental Implications.                               | a. about the effects of coal mining, production of crude oil on the environment.<br>b. about the effect of bio-degradeable characteristics of plastics on the environment.                                      | a. report on the possible costs, benefits and consequences of the production of plastics as these relate to style of life, environmental contamination and depletion of resources. |
| 3. Plastics are a result of complex chemical changes during manufacture.                            | 3. The Material<br>-sources<br>-restructuring<br>-additives. | a. what plastics are made of.<br>b. how plastics are made by recombining elements.  |  |

\* Common concepts in *script*. These are concepts common to most units.



| GENERALIZATIONS                 | TECHNICAL AND *COMMON CONCEPTS               | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|---------------------------------|--|--|--|
| 4. Plastics come in many kinds. | -physical forms<br><br>4. Kinds of Plastics. | The student will learn:<br><br>c. the forms plastics come in<br>-sheet<br>-film<br>-pellets<br>-powder<br>-beads<br>-structural shapes<br>-pipe.<br><br>a. about the various kinds of plastics and their uses<br><br>-acrylics<br>-polyethylene<br>-polystyrene<br>-vinyl<br>-polyester resins<br>-epoxy resins<br>-fluorocarbons<br>-polyurethane foam<br>i. flexible<br>ii. rigid. | The student will:<br><br>a. make a display of the various physical forms plastics come in. |



| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|---|---|--|---|
| 3. Plastics are manu-<br>factured into products<br>by various forming<br>processes.         | 5. Forming Plastics:<br>a. molding<br>-injection molding<br>-rotational molding<br>-compression<br>-transfer<br>b. casting<br>-dip<br>-slush<br>-rotational<br>c. foaming.<br>d. restructuring<br>-lamination<br>-emboss<br>-weave. | The student will learn:<br>a. how the injection<br>process works.<br>b. how to use casting<br>plastics safely. | The student will:<br>a. form a product using the injection<br>molding machine.<br>b. form a product using the casting<br>process.<br>c. form a product using the foaming process.<br>d. laminate and emboss plastics. |
| 6. Nearly all accidents<br>occur as a result of<br>unsafe acts and/or<br>unsafe conditions. | 6. Safety.  | a. to use the appropriate<br>tools and materials<br>in a safe manner.  | a. study the work area for unsafe conditions<br>-good ventilation<br>-care of toxic materials<br>-fire hazards of mixing certain chemicals.   |

\* Common concepts in script. These are concepts common to most units.



MATERIALS

EARTHS - CERAMICS

MODULE FOURTEEN

## MODULE FOURTEEN

### EARTHS - CERAMICS

#### INTRODUCTION

Ceramics is one of the oldest crafts known to mankind and continues to play an important role in modern industry.

This course will provide students with an insight into the manufacture of clay products and allow them to practice the processes required in the manipulation of the material.

#### I. OBJECTIVES

The objectives of this module in ceramics are to:

1. Introduce the students to some of the common methods used to shape and form clay products.
2. Provide the students with an opportunity to practice the skills required to shape clay products.

#### II. REFERENCES

1. Brennan, Thomas J. CERAMICS. Goodheart, 1964.
2. Kazanas, H.C. & Klein, R.S. TECHNOLOGY OF INDUSTRIAL MATERIALS. Bennett Co., 1974.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS             | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|--|--|---|--|
| 1. A productive society must prepare its members to make realistic vocational choices. | 1. Occupational Information.               | The student will learn:<br>a. how to use the Canadian Classification and Dictionary of Occupations.   | The student will:<br>a. prepare a file on occupational information related to the ceramics industry.<br>b. list educational and apprenticeship requirements of a bricklayer.<br>c. list job opportunities in the ceramics field. |
| 2. Nearly all accidents occur as a result of unsafe acts and/or conditions.            | 2. Safety<br>a. unsafe conditions.         | a. the procedure for evaluating unsafe conditions.<br>b. to analyze activities leading to unsafe acts.  | a. visually inspect the work area for unsafe conditions.<br>b. use the tools and equipment in a safe and correct manner.   |
| 3. Some natural materials can be changed to produce products useful to man.            | 3. Natural Materials<br>a. clay<br>b. sand | a. where clay deposits are found in Alberta.<br>b. what processes the clay goes through before it is used in a product.<br>c. how glass is made.<br>d. how bricks are made. | a. draw a map of Alberta showing clay deposits.<br>b. prepare the mortar and lay up two rows of bricks in a short wall.  |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS            | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES   |
|--|---|--|--|
| 4. Materials that are plastic can be formed by molds or shaped by hand or machine. | 4. Material Forming<br>a. hand forming.   | The student will:<br>a. learn how to prepare clay for forming.   | The student will:<br>a. make clay products using the following methods<br>-soil<br>-propped up slab<br>-slab on cylinder with handle<br>-container with lid<br>-form a product using the potter's wheel<br>-form a product using a mold by slip casting. |
| 5. The structure of some natural materials can be changed by heat.                 | b. molds<br>-slip casting.<br>5. Glazing. | b. learn how molds are made.<br>a. know the basic ingredients of glaze.<br>b. know the meaning of<br>-opaque<br>-transparent<br>-matt.<br>c. know different methods of applying glaze. |  |
|  | 6. Firing.                                | a. learn how to stack the kiln.  | a. set up the kiln and fire the products.  |

MATERIALS

EARTHS - CONCRETE

MODULE FIFTEEN

## MODULE FIFTEEN

### EARTHS - CONCRETE

#### INTRODUCTION

Concrete is a very versatile and nearly indestructible building material. Its importance to the building and road industry is immeasurable. This module gives a glimpse of its use and methods of handling it.

#### I. OBJECTIVES

The objectives of this module are to:

1. Introduce students to some of the practices and procedures for handling concrete.
2. Provide students with the opportunity to mix and place concrete.

#### II. REFERENCES

1. A 23-1-1967. CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION.  
Canada Standards Association.
2. CONCRETE FORM CONSTRUCTION. Delmar Publishers (Canada) Ltd.
3. DESIGN AND CONTROL OF CONCRETE MIXTURES. 1968.  
Portland Cement Association, 10020 - 108 Street, Edmonton, Alberta\*
4. Taylor, G. D. MATERIALS OF CONSTRUCTION. Longman, 1974.

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\* Has good resource materials available.



| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|--|---|---|---|
| 1. A productive society must prepare its members to make realistic vocational choices. | 1. Occupational Information.  | The student will learn:<br>a. how to use the Canadian Classification and Dictionary of Occupations to identify jobs.  | The student will:<br>a. prepare a file of occupational information related to the concrete industry.<br>b. list a number of jobs of interest to the student within the concrete industry. |
| 2. Nearly all accidents occur as a result of unsafe acts and/or unsafe conditions.     | 2. Safety.  | a. how to analyze a job situation for potential unsafe conditions.  |   |
| 3. Some natural materials can be changed to produce products useful to man.            | 3. Natural Materials<br>a. ingredients<br><br>b. mixing concrete<br>-materials<br>-proportions<br>-tests. | a. how cement is manufactured<br>-raw materials used<br>-processing.<br><br>b. the reasons for certain proportions of the ingredients and the effect on<br>-strength<br>-porosity<br>-wearability.<br><br>c. effect of aging or curing. | a. identify locations of Alberta cement plants and give reasons for the sites.<br><br>b. mix concrete in various proportions and test for<br>- strength<br>- porosity.                    |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|--|--|---|--|
| 4. Materials that are plastic can be formed by molds or shaped by hand or machine. | <p>4. Forming</p> <p>a. forms or molds</p> <p>b. placing concrete</p> <p>c. reinforcing.</p> <p>5. Technological implications.</p> <p>6. Environmental implications.</p> | <p>The student will learn:</p> <p>a. how to mold concrete by using forms.</p> <p>b. other methods of forming.</p> <p>a. the cost benefits for concrete over time.</p> <p>b. manufacturing methods</p> <p>-reinforced concrete</p> <p>-prefabrication.</p> <p>a. about the availability of natural materials</p> <p>-durability</p> <p>-pollution</p> <p>-rate of consumption.</p> | <p>The student will:</p> <p>a. build a form for a project he wants to cast.</p> <p>b. mix concrete and place it in the form.</p> <p>c. place reinforcing iron or wire to strengthen the product.</p> <p>d. cure the concrete, remove the form and clean up.</p> <p>a. write an essay on the use of concrete in the construction industry with implications for the future.</p> |

MATERIALS

TEXTILES

MODULE SIXTEEN

## MODULE SIXTEEN

### TEXTILES

The study of textiles will give an intelligent appraisal of standards and brands of merchandise, an ability to distinguish quality in fabric and an understanding of the proper use of different qualities.

The historical and cultural associations as well as the handling of fabrics becomes a fascinating study, from the source of the raw materials to the way in which the materials are processed and the products distributed.

As a result of this study, the consumer-merchant and the consumer-customer will know how to buy and what to buy. It is important that students have products to handle and compare.

The major concepts dealing with the manufacture and processing of textiles are outlined in the content. In addition eight concepts common to the total program are studied where appropriate to each module.

#### 1. Consumer Awareness

- quality
- effective advertising
- specifications
- dollar value
- buying procedures
- availability
- parts
- serving.

## 2. Environmental Implications

- time element (past, present, future)
- rates of consumption
- conservation
- alternatives
- pollution (land, air, water)

## 3. Graphic Interpretation

- schematic
- symbols
- drawing interpretation
- visuals
- technical drawing and interpretation

## 4. Measurement

- British Engineering System (present English systems)
- System Internationale (S.I.)
- accuracy
- tools and instruments
- tolerances
- precision
- estimating
- approximating
- computations (including graphs, charts, interpolation)

## 5. Career Information

- benefits
- unionism
- local opportunities
- job mobility (vertical, horizontal, geographic)
- future
- retraining and upgrading
- jobs vs. careers

#### 6. Societal Implications

- time (past, present, future)
- economic
- life patterns
- status
- values and mores

#### 7. Technological Implications

- costs, benefits, consequences (C.B.C.)
- resource use and abuse
- tool development and use
- manufacturing
- servicing
- obsolescence
- design process
- planning

#### 8. Safety

- unsafe conditions
- unsafe acts

### I. OBJECTIVES

The objectives of this module in Textiles is to:

1. Develop student knowledge of and interest in textiles
2. Provide the student with an opportunity to use and maintain sewing equipment
3. Provide the student with information about occupational opportunities in the textile field.

## II REFERENCES

1. Craig, Hazel T. CLOTHING: A COMPREHENSIVE STUDY. McClelland & Stewart, 1973 Rev.ed.
2. McCall's and Simplicity. LEARN TO SEW Books.
3. SEWING MACHINE MANUALS.
4. Tod and Roberts. HOW TO LOOK ATTRACTIVE ALL THE TIME.

## III. SUGGESTED APPROACH

Students enrolled in Textiles will have widely varying backgrounds of knowledge and skill in this field. It is essential that sewing projects should be suited directly to individual needs of students in terms of sewing ability and time available. It is recommended that a minimum of two projects be completed by each student. Emphasis should be placed on developing high standards of workmanship and on appreciation of quality and suitability of clothing.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|---|--|---|--|
| 1. Man uses many types of fabrics for clothing ranging from natural to synthetic. | <p>1. Textiles</p> <p>a. natural</p> <p>b. man-made</p> <p>c. synthetic</p> <p>d. yarns</p> <p>e. weaves</p> <p>f. finishes.</p> | <p>The student will learn:</p> <p>a. about the evolution of fibers used for fabric manufacture.</p> <p>b. that yarns differ in thread count and twist.</p> <p>c. to recognize simple and complex yarn and the effect of weave on durability.</p> <p>d. to recognize common finishes used.</p> | <p>The student will:</p> <p>a. examine fibers under a microscope to discover their structure.</p> <p>b. test fibers by burning, feeling, bleaching and with chemicals to identify fibers.</p> <p>c. collect and label samples.</p> <p>d. practice bleaching and shrinking material.</p> <p>e. test material for strength, absorption, color fastness, washability, heat-conductivity, reaction to acids and alkali, crease resistance, water repellence.</p> |



| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS                                  | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|--|---|---|---|
| 2. Planning a functional wardrobe requires knowledge of fabrics, basic garment construction and a sense of design. | 2. Clothing Selection<br>-budgeting<br>-labels<br>-dollar value | The student will learn:<br>a. about budgeting.<br>b. about how clothing is labelled.<br>c. about store pricing systems. | The student will:<br>a. plan a clothing budget and list the clothing needed.<br>b. collect and study clothing labels.<br>c. compare stores and catalogue standards.<br>d. compare costs of ready-made clothes with personal sewing. |
| 3. Conservation and proper care of clothing is good economic sense.  | 3. Clothing Care<br>a. personal hygiene                         | a. about the importance of deodorants and anti-perspirants.   | a. practice<br>-shoe care<br>-mending and pressing clothes<br>-ironing and folding a shirt<br>-pressing pants<br>-laundering socks and sweaters.  |
|  | 4. The Sewing Machine.<br>5. The Steam Iron.                    | a. about the care and maintenance of a sewing machine.  | a. thread and operate a sewing machine.<br>b. oil and service a sewing machine.<br>a. use and maintain a steam iron.<br>b. use an iron with a press cloth and press mitt.   |

\* Common concepts in *script*. These are concepts common to most units.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|--|--------------------------------|---|---|
| 6. The design and construction of a garment affects its appearance, comfort and performance. | 6. Garment Construction.       | The student will learn:   | <p>The student will:</p> <p>a. construct a garment or article for household use.</p> <p>Suggestions:</p> <p>Girls -lined skirt or jumper<br/>-blouse with set in sleeve<br/>-dress</p> <p>Boys -chef's apron and cap<br/>-game bag, money belt<br/>-gun shell carrier<br/>-Poncho</p> <p>Girls or Boys -slip cover<br/>-upholster a chair<br/>-article made of canvas;<br/>duffel bag, pup tent.</p> <p>a. use the C.C.D.O. to identify jobs in the field of textiles and clothing production or merchandising.</p> |
|  | 7. Occupational Opportunities. | <p>a. how to use the Canadian Classification and Dictionary of Occupations.</p> |   |

\* Common concepts in *script*. These are concepts common to most units.

MATERIALS

FOODS

MODULE SEVENTEEN

## MODULE SEVENTEEN

### FOODS

#### INTRODUCTION

To protect his health and build an efficient body, man needs to give more thought to his diet. He must know his nutritional needs and how to select and prepare foods to meet these needs. He must develop skill in the management of money, time and energy.

The major concepts dealing with food preparation are outlined in the content area following. In addition eight concepts common to the total program are studied where appropriate in each module.

#### 1. Consumer Awareness

- quality
- effective advertising
- specifications
- dollar value
- buying procedures
- availability
- parts
- serving

#### 2. Environmental Implications

- time element (past, present, future)
- rates of consumption
- conservation
- alternatives
- pollution (land, air, water)

### 3. Graphic Interpretation

- schematic
- symbols
- drawing interpretation
- visuals
- technical drawing and interpretation

### 4. Measurement

- British Engineering System (present English systems)
- System Internationale (SI)
- accuracy
- tools and instruments
- tolerances
- precision
- estimating
- approximating
- computations (including graphs, charts, interpolation)

### 5. Career Information

- benefits
- unionism
- local opportunities
- job mobility (vertical, horizontal, geographic)
- future
- retraining and upgrading
- jobs vs. careers

### 6. Social Implications

- time (past, present, future)
- economic
- life patterns
- status
- values and mores

## 7. Technological Implications

- costs, benefits, consequences (CBC)
- resource use and abuse
- tool development and use
- manufacturing
- servicing
- obsolescence
- design process
- planning

## 8. Safety

- unsafe conditions
- unsafe acts

## 1. OBJECTIVES

The objectives of the module on Foods are:

1. To practice safety and sanitation in the kitchen.
2. To develop and maintain good food habits.
3. To develop judgement as to the reliability of health information (fads or facts).
4. To prepare a simple meal.
5. To acquire working knowledge of cooking terms.
6. To become aware of vocational opportunities in the food services.

## II. REFERENCES

1. McDermott, Tritling, Nicholas & Meiklejohn. FOOD FOR MODERN LIVING.  
Canadian Edition. McClelland & Stewart.
2. Shank and Fitch. GUIDE TO MODERN MEALS. Canadian Edition. McGraw-Hill.

## III. SUGGESTED APPROACH

The primary aim of the course is to teach the science and fundamentals of cooking. In planning the products, take into consideration the ability, interest and needs of the students. Students should become familiar with the characteristics of good products and should gain skill in judging their own products. Students should at all times apply rules of safety and sanitation. Stress management of time, energy and resources.

| GENERALIZATIONS  | TECHNICAL AND *COMMON CONCEPTS   | LEARNING TASKS   | BEHAVIOURAL OBJECTIVES  |
|--|--|--|---|
| 1. The understanding and practice of safety principals and sanitation is equally important in the family kitchen and the commercial food center. | 1. Sanitation and Safety <ul style="list-style-type: none"> <li>a. personal preparation</li> <li>b. safety procedures</li> </ul> | The student will know: <ul style="list-style-type: none"> <li>a. how to dress and clean up before handling food.</li> <li>b. what to look for as an unsafe condition or act.</li> <li>c. the safety rules for the kitchen.</li> <li>d. the treatment for cuts, burns and scalds.</li> <li>e. how and why to be careful with garbage.</li> <li>f. the rules for safe storage of food.</li> <li>g. reasons for pasteurized milk and government-inspected meat.</li> <li>a. about Canada's Food Guide as a basis for planning well balanced meals.</li> </ul> | The student will: <ul style="list-style-type: none"> <li>a. wear proper dress, have hair under control and have clean hands and nails.</li> <li>b. identify unsafe conditions found in the kitchen.</li> <li>c. practice safe procedures.</li> <li>d. maintain a clean refrigerator and stove.</li> <li>e. establish a good system of dishwashing and of garbage disposal.</li> </ul> |
| 2. The foods we eat supply our bodies with the nutrients essential for growth, health and energy.  | 2. Nutrition.  |  | <ul style="list-style-type: none"> <li>a. list the foods eaten during a 24 hour period and compare it with Canada's Food Guide.</li> <li>b. plan a week's menu for a family of four.</li> </ul>   |

\* Common concepts in *script*. These are concepts common to most units.



| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS  | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES  |
|---|---|---|---|
| 3. Management of time and money are essential to satisfactory food-preparation.   | 3. Management<br><br>-measurement<br><br>-budgeting<br><br>-planning. | The student will learn:<br>a. to use cooking terms.<br>b. to measure quantities accurately.   | The student will:<br>a. follow a recipe to prepare a food product.<br><br>b. calculate the cost of a meal.<br><br>c. compare cost of a ready mixed or prepared foods with home-prepared<br><br>d. plan a work procedure for preparing a simple breakfast. |
| 4. Knowledge is required in the selection and preparing of foods that provide a balance of nutrients in the daily diet. | 4. Food Preparation.  | a. how to prepare simple meals including<br>- beverages<br>- quick breads.<br>- eggs<br>- vegetables and salads.<br>- pasta and cheese. | a. make and serve coffee, tea, cocoa.<br>b. make pancakes or waffles.<br>c. fry or poach an egg.<br>d. make a salad.<br>e. cook macaroni and cheese.<br>f. fondue   |

\* Common concepts in script. These are concepts common to most units.

| GENERALIZATIONS   | TECHNICAL AND *COMMON CONCEPTS | LEARNING TASKS  | BEHAVIOURAL OBJECTIVES   |
|---|--------------------------------|---|--|
|   |                                | - meat  | <p>The student will:</p> <ul style="list-style-type: none"> <li>g. identify common cuts of meat.</li> <li>h. use one method of tenderizing meat.</li> <li>i. prepare a meat dish.</li> <li>j. make gravy.</li> <li>k. use broiler and pressure cooker to prepare meat.</li> <li>l. serve raw and cooked fruits.</li> <li>m. make a fruit dessert.</li> </ul> |
| 5. The food industry provides employment in production, processing, marketing, preparing and serving of food. | 5. Occupations.                | <p>The student will learn:</p> <ul style="list-style-type: none"> <li>a. how to use the Canadian Classification and Dictionary of Occupations.</li> </ul> | <ul style="list-style-type: none"> <li>a. use the CCD0 to identify jobs in the field of food preparation and list the training required.</li> </ul>  |

\* Common concepts in script. These are concepts common to most units.

## E. GENERAL

### 1. Research Module

The purpose of the Research Module is to allow individual students to engage in an in-depth study of a problem related to any of the career fields.

The time period is 25 hours and qualifies as a regular module.

The module provides for individualizing the program to allow for special interests of students. The student should prepare a proposal of his research and have it approved by the teacher. The proposal should contain:

- a) A statement of the problem.
- b) The procedure to be followed in the research of the problem.
- c) A list of the materials and lab facilities to be used.
- d) A time line of activities.

### 2. Developmental Module

The purpose of the Developmental Module is to provide a 25-hour block of time for the teacher to try out new content with his class. The content of the proposal or project should be discussed with the Associate Director of Curriculum for Industrial Education.

### 3. Production Service Module

The purpose of Production Service is to provide for a class project in setting up a company to produce a product or service.

The Production Science 30 course will provide an outline from which content may be selected to develop a 25-hour module. The Production Science 30 is a full 4-5 credit course so the teacher must be selective in choosing the content for a 25-hour or one-credit module.



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